Prüfbericht - Produkte
Test Report - Products

Prüfbericht-Nr.: *Test report no.*:	**CN24CRS7 001**	**Auftrags-Nr.:** *Order no.*:	48232402 P01341945	Seite 1 von 29 *Page 1 of 29*
Kunden-Referenz-Nr.: *Client reference no.*:	238075299	**Auftragsdatum:** *Order date:*	2024-01-10	
Auftraggeber: *Client*:	Lead Year Enterprise Co., Ltd. 3RD FL 618 RUIGUANG RD NEIHU DISTRICT TAIPEI 114 TAIWAN			
Prüfgegenstand: *Test item*:	AC Adapter			
Bezeichnung / Typ-Nr.: *Identification / Type no.*:	See page 2 for details.			
Auftrags-Inhalt: *Order content*:	See test report for details.			
Prüfgrundlage: *Test specification*:	See test report for details.			

Wareneingangsdatum: *Date of sample receipt*:	2024-04-02	See Appendix 1 (Photographs of UUT)
Prüfmuster-Nr.: *Test sample no:*	A003688816-002 to A003688816-004	
Prüfzeitraum: *Testing period*:	2024-04-10 - 2024-04-12	
Ort der Prüfung: *Place of testing*:	TUV Rheinland Taiwan Ltd.	
Prüflaboratorium: *Testing laboratory:*	TUV Rheinland Taiwan Ltd.	
Prüfergebnis*: *Test result**:	Pass	

geprüft von: tested by:	X Cory Wang	**genehmigt von:** *authorized by*:	X
Datum: *Date:* 2024-04-17		**Ausstellungsdatum:** *Issue date:* 2024-04-17	
Stellung / Position:	Project Handler	**Stellung** / Position:	Reviewer

Sonstiges /
Other:

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery*:	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*P(ass) = passed a.m. test specification(s)*	*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. *The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.*		
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3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. *Test clauses with remark of * are subcontracted to qualified subcontractors and descripted under the respective test clause in the report.* *Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.*		
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnisen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezueglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. *The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.*		

TEST REPORT **Energy Efficiency Regulations** **Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies**	
Report Reference No......:	CN24CRS7 001
Compiled by (+ signature) .....:	See cover page
Approved by (+ signature).....:	See cover page
Date of issue .....:	See cover page
Testing Laboratory.....:	TUV Rheinland Taiwan Ltd.
Address .....:	11F., No. 758, Sec. 4, Bade Rd., Songshan Dist., Taipei 105, Taiwan
Testing location/procedure.....:	TUV Rheinland Taiwan Ltd. ☒ Applicant Facility ☐
Address .....:	TÜV Rheinland Taiwan Ltd., Taoyuan Testing Laboratories 4F-1, No. 38, Huaya 1st Road, Guishan District, Taoyuan City 333, Taiwan
Applicant's Name .....:	See cover page
Address .....:	See cover page
Test specification	
Standard (Regulation) .....:	☒ Canada's Energy Efficiency Regulations, 2016 (SOR/2016-311) - (External Power Supplies) ☒ Canada Quebec Energy Efficiency Regulations as published in the Quebec Gazette, Part 2, Volume 150, No. 50, Dec. 2018 (O.C. 1394-2018) Act respecting energy efficiency and energy conservation standards for certain electrical or hydrocarbon-fuelled appliances (Schedule 2, External Power Supply) ☒ Canada Ontario Regulation 509/18: Energy And Water Efficiency - Appliances And Products (Schedule 7, External Power Supply) ☒ U.S. CEC California Appliance Efficiency Regulations California Code of Regulations, Title 20, Division 2, Chapter 4. Energy Conservation, Article 4. Appliance Efficiency Regulations, item (u) Power Supplies ☒ U.S. EISA 2007, section 301(c) – Class A external power supply ☒ U.S. DOE 10 CFR Part 430.32(w) Final Rule, published on Feb. 10, 2014 (Level VI) ☒ Australian Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014 (GEMS Act) ☒ EU Energy-related Products (ErP) directive Commission Regulation (EU) 2019/1782 – 1 October 2019 laying down ecodesign requirements for external power supplies pursuant to Directive 2009/125/EC of the European Parliament and of the Council and repealing Commission Regulation (EC) No 278/2009 ☒ EU Code of Conduct Version 5, published on Oct. 29, 2013 (Level VI)

Test procedure .....:	☒ NRCan: CAN/CSA-C381.1-17 “Energy performance of external ac-dc and ac-ac power supplies.” ☒ Quebec: CAN/CSA-C381.1-17 “Energy performance of external ac-dc and ac-ac power supplies.” ☒ Ontario: U.S. DOE 10 Code of Federal Regulations Part 430, Subpart B, §430.23 (bb) External power supplies ☒ CEC: US EPA “Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies” dated August 11, 2004. ☒ US DOE: Appendix Z to Subpart B of 10 CFR Part 430 ☒ Australian and New Zealand MEPS (Minimum Energy Performance Standards) - AS/NZS 4665.1:2005 + A1:2009 - AS/NZS 4665.2:2005 + A1:2009 ☒ CE ErP: External AC -DC and AC-AC power supplies. Determination of no-load power and average efficiency of active modes in accordance with EN 50563:2011+A1 ☒ Generic: Measurement of low power modes in accordance with IEC 62301:2011 and EN 50564: 2011
Test Report Form .....:	TUVRNA OEE EPS
TRF originator. .....:	TUVRNA
Master TRF (date) .....:	Dated 2024-01
Test item description .....:	Single-voltage external AC to DC power supply (SWITCHING POWER SUPPLY)
Trade Mark .....:	TIGER POWER®
Manufacturer .....:	Same as applicant
Model /Type reference .....:	TG16-0180-01
Ratings .....:	Nameplate Input: 100-240Vac, 50-60Hz, 3.0Amax. Nameplate Output: +24.0Vdc, 7.5A, 180.0W

Copy of marking plate:



Test items particulars:	
Classification of installation and use ..... :	☒ Class I ☐ Class II ☐ Class II with functional earth
Supply Connection..... ..... :	☐ Direct plug in ☒ Detachable power supply cord ☐ Non-detachable power supply cord
Category ..... :	☒ Basic Voltage EPS ☐ Low Voltage EPS
USB Power Delivery (USB-PD) EPS..... .... :	☒ No ☐ Yes
Output cord length..... :	55.6cm ± 1cm
Output cord cross-sectional areas ..... :	18AWG
Built-in switch..... :	Not present
UUT supplied product..... :	Audio/video, information and communication technology equipment
UUT as service part..... :	☒ No ☐ Yes (end use equipment brand:_____, Model _____)
Photo ..... :	See Appendix 1 (Photographs of UUT)
Country of manufacture..... :	See copy of marking plate
Name of Testing Laboratory..... :	See cover page
Name of technician..... :	See cover page
Ambient temperature..... :	See item 3 of test report
Date and location of test..... :	See item 3 of test report and cover page
Test equipment..... :	See Appendix 2 (List of Calibrated Measurement Equipment)
Definition of Load ..... :	☒ Electronic Load ☐ Resistive Load
TÜV Rheinland Energy Efficiency Verification Mark..... :	☐ Yes ☒ No
Possible test case verdicts:	
Test case does not apply to the test object.. :	N/A
Test item does meet the requirement: ..... :	P(ass)
Test item does not meet the requirement: .. :	F(ail)
Testing:	
Date of receipt of test item ..... :	See cover page
Date(s) of performance of test..... :	See clause 3 for details
Test sample identification:	
Sample receipt number. ..... :	See cover page
Test specimen ..... :	No. 1, 2, 3

1. General Description of Equipment

The UUT (Unit Under Test) is a Single-voltage external AC to DC power supply (SWITCHING POWER SUPPLY), detachable power supply cord, switching type with non-detachable output cord for supplying power to Audio/video, information and communication technology equipment.

Summary of testing:

The decision rule of conformity of this test report is following the requirements of the requested standard in this test report, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, except for:

- Power measurement uncertainty according to section 4 and Annex D of IEC 62301:2011. Coverage Factor k = 2, Confidence Level = 95%

are considered in this report.

- All tests were performed at:
  ☒ 115V/60Hz
  ☒ 230V/60Hz

Factory(ies):

1. Dongguan Amax Electronics Co Ltd.
   No. 168 Changan XinminRoad Changan Town Dongguan City Guangdong Province 523871 China.
2. Smart Industries Sdn Bhd
   LOT 5913, JALAN PERUSAHAAN 7 KAMUNTING INDUSTRIAL ESTATE KAMUNTING PERAK 34600 MALAYSIA

2. General Measurement Conditions

2.1 Test Room

The tests were carried out in a room that has an air speed close to the UUT of ≤ 0.5 m/s, and the ambient temperature was maintained at:

☒ 20°C ± 5 °C

throughout the tests.

2.2 Test Voltage

The input voltage was within the specified voltage ±1% and the specified frequency ±1%. The UUT was tested at rated supply as mentioned in Summary of testing. The input power source is capable of delivering at least 10 times the nameplate input power of the UUT. The THD of the supply voltage when supplying the UUT in the specified mode was not exceeding 2%, up to and including the 13th harmonic.

2.3 Test Setup

The samples were operated at 100% of nameplate current output for at least 30 minutes immediately before conducting efficiency measurements.

All testing leads used in the test set-up were of large gauge and shortest possible length in order to avoid the introduction of errors in the testing process. As a minimum requirement select all leads used in the test set-up as specified in Table B.2, “Commonly used values for wire gauges and related voltage drops”, in IEEE 1515.

A total of 3 test specimens were tested.

2.4 Load Conditions

The UUT was tested at five active mode load conditions and the no load condition according to below table by using ☒ electronic loads / ☐ resistive loads.

The relevant load conditions are as follows:

Percentage of nameplate output current	
Load condition 1	100 % ± 2 %
Load condition 2	75 % ± 2 %
Load condition 3	50 % ± 2 %
Load condition 4	25 % ± 2 %
Load condition 5 *1)	10 % ± 1 %
Load condition 6	0 % (no-load condition)

*1) *Load condition 5 is information requirement only in ErP directive (EU) 2019/1782 when UUT’s nameplate output power more than 10 W.*

3. Test Details

All results were taken after warm-up of 0.5 hr immediately.

The ambient temperature at the beginning of the test sequence (surrounding of the UUT): 22°C ± 5 °C

The relative humidity at the beginning of the test sequence (surrounding of the UUT): RH 55 ± 5%

Date of test:

Tested model:	**TG16-0180-01**			**Test specimen 1**		**at 115V/60Hz**
Nameplate Output:	**+24.0Vdc, 7.5A, 180.0W**					
Percent of Nameplate Current	**0%**	**25%**	**50%**	**75%**	**100%**	**Remark**
RMS Input Voltage (V)	115.0	115.0	115.0	114.9	114.8	
Input Frequency (Hz)	60.00	60.00	60.00	60.00	60.00	
RMS Input Power (W)	0.137	50.98	99.83	148.7	198.6	Input Power (Pin)
Total Harmonic Distortion (THDv, %)	0.053	0.095	0.116	0.112	0.112	
True Power Factor	0.021	0.954	0.967	0.990	0.993	
RMS Output Voltage (Vdc)	24.59	24.43	24.22	23.99	23.76	
RMS Output Current (A)	--	1.869	3.748	5.624	7.506	
Active Output Power (W)	--	45.66	90.76	134.9	178.3	Output Power (Pout)
Power Consumed by UUT (W)	0.137	5.324	9.072	13.78	20.28	<0.15W at no load ***)**
Efficiency (%)	--	89.56	90.91	90.74	89.79	(Pout/Pin)*100%
Average Efficiency (%)	--	**90.25**				>89.0% at active mode ***)**
Note: ***)** see item 4 of test report for details						

Tested model:	**TG16-0180-01**			**Test specimen 2**		**at 115V/60Hz**
Nameplate Output:	**+24.0Vdc, 7.5A, 180.0W**					
Percent of Nameplate Current	**0%**	**25%**	**50%**	**75%**	**100%**	**Remark**
RMS Input Voltage (V)	115.0	115.0	114.9	114.9	114.8	
Input Frequency (Hz)	60.00	60.00	60.00	60.00	60.00	
RMS Input Power (W)	0.141	51.15	99.84	149.1	199.2	Input Power (Pin)
Total Harmonic Distortion (THDv, %)	0.718	0.089	0.127	0.096	0.117	
True Power Factor	0.021	0.958	0.966	0.991	0.993	
RMS Output Voltage (Vdc)	24.64	24.50	24.29	24.07	23.84	

RMS Output Current (A)	--	1.871	3.747	5.627	7.505	
Active Output Power (W)	--	45.83	91.00	135.4	178.9	Output Power (Pout)
Power Consumed by UUT (W)	0.141	5.318	8.840	13.70	20.26	<0.15W at no load *)
Efficiency (%)	--	89.60	91.15	90.81	89.83	(Pout/Pin)*100%
Average Efficiency (%)	--	**90.35**				>89.0% at active mode *)
Note: *) see item 4 of test report for details						

Tested model:	**TG16-0180-01**			**Test specimen 3**	**at 115V/60Hz**
Nameplate Output:	**+24.0Vdc, 7.5A, 180.0W**				
Percent of Nameplate Current	**0%**	**25%**	**50%**	**75%**	**100%**	**Remark**
RMS Input Voltage (V)	115.0	115.0	114.9	114.9	114.8	
Input Frequency (Hz)	60.00	60.00	60.00	60.00	60.00	
RMS Input Power (W)	0.133	51.00	99.55	148.7	198.5	Input Power (Pin)
Total Harmonic Distortion (THDv, %)	0.053	0.083	0.119	0.103	0.117	
True Power Factor	0.020	0.957	0.966	0.990	0.993	
RMS Output Voltage (Vdc)	24.61	24.43	24.22	23.99	23.75	
RMS Output Current (A)	--	1.870	3.746	5.626	7.504	
Active Output Power (W)	--	45.68	90.71	135.0	178.2	Output Power (Pout)
Power Consumed by UUT (W)	0.133	5.320	8.841	13.73	20.26	<0.15W at no load *)
Efficiency (%)	--	89.57	91.12	90.77	89.79	(Pout/Pin)*100%
Average Efficiency (%)	--	**90.31**				>89.0% at active mode *)
Note: *) see item 4 of test report for details						

Tested model:	**TG16-0180-01**			**at 115V/60Hz**
Nameplate Output:	**+24.0Vdc, 7.5A, 180.0W**			
Test specimen	**1**	**2**	**3**	
Percent of Nameplate Current	**10%**	**10%**	**10%**	**Remark**
RMS Input Voltage (V)	115.0	115.0	115.0	
Input Frequency (Hz)	60.00	60.00	60.00	
RMS Input Power (W)	21.62	21.85	21.70	Input Power (Pin)
Total Harmonic Distortion (THDv, %)	0.081	0.081	0.081	
True Power Factor	0.903	0.904	0.902	
RMS Output Voltage (Vdc)	24.55	24.62	24.56	

RMS Output Current (A)	0.744	0.745	0.745	
Active Output Power (W)	18.27	18.34	18.29	Output Power (Pout)
Power Consumed by UUT (W)	3.354	3.510	3.407	
Efficiency (%)	84.49*)	83.94*)	84.30*)	Efficiency at low load (10 %)
Note: *) see item 4 of test report for details				

Tested model:	TG16-0180-01			Test specimen 1		at 230V/50Hz
Nameplate Output:	**+24.0Vdc, 7.5A, 180.0W**					
Percent of Nameplate Current	**0%**	**25%**	**50%**	**75%**	**100%**	**Remark**
RMS Input Voltage (V)	229.9	229.9	229.9	229.8	229.8	
Input Frequency (Hz)	50.00	50.00	50.00	50.00	50.00	
RMS Input Power (W)	0.139	50.73	98.72	146.5	195.0	Input Power (Pin)
Total Harmonic Distortion (THDv, %)	1.673	0.095	0.071	0.099	0.106	
True Power Factor	0.009	0.847	0.904	0.931	0.951	
RMS Output Voltage (Vdc)	24.61	24.44	24.23	24.00	23.77	
RMS Output Current (A)	--	1.869	3.748	5.628	7.508	
Active Output Power (W)	--	45.67	90.80	135.1	178.5	Output Power (Pout)
Power Consumed by UUT (W)	0.139	5.061	7.925	11.42	16.50	<0.15W at no load ***)**
Efficiency (%)	--	90.02	91.97	92.21	91.54	
Average Efficiency (%)	--	**91.43**				>89.0% at active mode *)
Note: ***)** see item 4 of test report for details						

Tested model:	TG16-0180-01			Test specimen 2		at 230V/50Hz
Nameplate Output:	**+24.0Vdc, 7.5A, 180.0W**					
Percent of Nameplate Current	**0%**	**25%**	**50%**	**75%**	**100%**	**Remark**
RMS Input Voltage (V)	229.9	229.8	229.8	229.8	229.8	
Input Frequency (Hz)	50.00	50.00	50.00	50.00	50.00	
RMS Input Power (W)	0.138	50.72	98.61	147.0	195.6	Input Power (Pin)
Total Harmonic Distortion (THDv, %)	0.068	0.091	0.104	0.095	0.105	
True Power Factor	0.009	0.842	0.903	0.934	0.952	
RMS Output Voltage (Vdc)	24.64	24.50	24.29	24.08	23.86	
RMS Output Current (A)	--	1.869	3.748	5.627	7.505	
Active Output Power (W)	--	45.79	91.05	135.5	179.1	Output Power (Pout)
Power Consumed by UUT (W)	0.138	4.926	7.560	11.51	16.55	<0.15W at no load ***)**
Efficiency (%)	--	90.29	92.33	92.17	91.54	(Pout/Pin)*100%
Average Efficiency (%)	--	**91.58**				>89.0% at active mode *)
Note: ***)** see item 4 of test report for details						

Tested model:	TG16-0180-01	Test specimen 3	at 230V/50Hz

Nameplate Output:	**+24.0Vdc, 7.5A, 180.0W**					
Percent of Nameplate Current	**0%**	**25%**	**50%**	**75%**	**100%**	**Remark**
RMS Input Voltage (V)	229.9	229.8	229.8	229.8	229.8	
Input Frequency (Hz)	50.00	50.00	50.00	50.00	50.00	
RMS Input Power (W)	0.146	50.61	98.42	146.6	195.1	Input Power (Pin)
Total Harmonic Distortion (THDv, %)	0.068	0.086	0.122	0.102	0.109	
True Power Factor	0.008	0.842	0.902	0.933	0.951	
RMS Output Voltage (Vdc)	24.59	24.44	24.22	24.00	23.77	
RMS Output Current (A)	--	1.871	3.747	5.626	7.508	
Active Output Power (W)	--	45.72	90.76	135.0	178.4	Output Power (Pout)
Power Consumed by UUT (W)	0.146	4.892	7.660	11.59	16.66	<0.15W at no load ***)**
Efficiency (%)	--	90.33	92.22	92.10	91.46	(Pout/Pin)*100%
Average Efficiency (%)	--	**91.53**				>89.0% at active mode *)
Note: ***)** see item 4 of test report for details						

Tested model:	**TG16-0180-01**			**at 230V/50Hz**
Nameplate Output:	**+24.0Vdc, 7.5A, 180.0W**			
Test specimen	**1**	**2**	**3**	
Percent of Nameplate Current	**10%**	**10%**	**10%**	**Remark**
RMS Input Voltage (V)	230.0	229.8	230.0	
Input Frequency (Hz)	50.00	50.00	50.00	
RMS Input Power (W)	21.66	21.86	21.84	Input Power (Pin)
Total Harmonic Distortion (THDv, %)	0.073	0.081	0.082	
True Power Factor	0.655	0.654	0.654	
RMS Output Voltage (Vdc)	24.56	24.62	24.56	
RMS Output Current (A)	0.746	0.746	0.744	
Active Output Power (W)	18.32	18.37	18.27	Output Power (Pout)
Power Consumed by UUT (W)	3.340	3.492	3.567	
Efficiency (%)	84.58***)**	84.03***)**	83.67***)**	Efficiency at low load (10 %) ***)**
Note: Note: ***)** see item 4 of test report for details				

4. Test Result

The samples submitted were tested and comply with the efficiency in the active mode and the energy consumption in the no-load mode at the corresponding national AC mains supply voltage according to following regulations:

Regulations		Remark
☒	Canada Energy Efficiency Regulations for External Power Supplies	Level VI
☒	Canada Quebec's Energy Efficiency Regulations as published in the Quebec Gazette Part 2, Volume 150, No. 50, Dec. 2018 (O.C. 1394-2018) Act respecting energy efficiency and energy conservation standards for certain electrical or hydrocarbon-fuelled appliances (Schedule 2, External Power Supply)	Level VI
☒	Canada Ontario Regulation 509/18: Energy And Water Efficiency - Appliances And Products (Schedule 7, External Power Supply)	Level VI
☒	U.S. CEC California Appliance Efficiency Regulations California Code of Regulations, Title 20, Division 2, Chapter 4. Energy Conservation, Article 4. Appliance Efficiency Regulations, item (u) Power Supplies (Table U-4)	Level IV
☒	U.S. EISA 2007, section 301(c) – Class A external power supply	Level IV
☒	U.S. DOE 10 CFR Part 430.32(w) Final Rule, published on Feb. 10, 2014 (Level VI)	Level VI
☒	Australian Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014 (GEMS Act) Australian and New Zealand MEPS (Minimum Energy Performance Standards)	Complied
☒	EU Energy-related Products (ErP) directive COMMISSION REGULATION (EU) No 2019/1782 – 1 October 2019	Complied. (equivalent to level VI)
☒	EU Code of Conduct Version 5, published on Oct. 29, 2013	Complied.

And the use of an efficiency mark, according to the international efficiency marking protocol, qualified with efficiency marking:

☐ IV ☐ V ☒ VI

Details of Minimum Efficiency Performance Standard (MEPS) refer to following tables.

Energy Efficiency Regulations
for External Power Supplies of
US CEC (Table U-4), US EISA 2007 (Class A EPS) and Australian and New Zealand MEPS

Nameplate Output	Minimum Efficiency in Active Mode	Verdict
<1 watt	0.5 * Nameplate Output	N/A
≥1 and ≤51 watts	0.09 * Ln (Nameplate Output) + 0.5	N/A
> 51 watts	0.85	P
Nameplate Output	**Maximum Energy Consumption in No-Load Mode**	**Verdict**
Any output	0.5 watts	P

Note(s):
1. Required Minimum Efficiency in Active Mode is superseded by level VI.
2. Where Ln (Nameplate Output) = Natural Logarithm of the nameplate output expressed in Watts.
3. An efficiency of 0.85 in decimal form corresponds to the more familiar value of 85%.

U.S. DOE 10 CFR Part 430.32(w) Final Rule, published on Feb. 10, 2014 for no-load electric power consumption and average active efficiency of external power supplies

Table I-1: Energy Conservation Standards for Direct Operation EPSs (Compliance Starting Feb. 10, 2016, Level VI)

Canada's Energy Efficiency Regulations (External Power Supplies); amendment 14 as published in the Canada Gazette, October 2018

CSA C381.1-17 Energy performance of external ac-dc and ac-ac power supplies

Table D.1: Direct operation EPS MEPS (Compliance Starting July 01, 2017, Level VI)

Canada Quebec Energy Efficiency Regulations as published in the Quebec Gazette Part 2, Volume 150, No. 50, Dec. 2018 (O.C. 1394-2018)

Act respecting energy efficiency and energy conservation standards for certain electrical or hydrocarbon-fuelled appliances

(Schedule 2, External Power Supply)

(Compliance Starting July 01, 2017, Level VI)

Canada Ontario Regulation 509/18: Energy And Water Efficiency - Appliances And Products

(Schedule 7, External Power Supply)

(Compliance Starting July 01, 2017, Level VI)

Single-Voltage External AC-DC or AC-AC Power Supply, Basic-Voltage			
Nameplate Output Power (Pno)	**Minimum Average Efficiency in Active Mode**		**Verdict**
≤ 1W	≥ 0.5 ×Pno + 0.16		N/A
1 W < to ≤ 49 W	≥ 0.071 × ln(Pno) − 0.0014 ×Pno +0.67		N/A
49W < to ≤ 250W	≥ 0.880		P
> 250W	≥ 0.875		N/A
Nameplate Output Power (Pno)	**Maximum Power in No-Load Mode**		**Verdict**
	☐ **Ac-Ac EPS**	☒ **Ac-Dc EPS**	
≤ 1W	≤ 0.21W	≤ 0.10W	N/A
1 W < to ≤ 49 W	≤ 0.21W	≤ 0.10W	N/A
49W < to ≤ 250W	≤ 0.21W		P
> 250W	≤ 0.50W		N/A
Single-Voltage External AC-DC or AC-AC Power Supply, Low-Voltage			
Nameplate Output Power (Pno)	**Minimum Average Efficiency in Active Mode**		**Verdict**
≤ 1W	≥ 0.517 × Pout + 0.087		N/A

1 W < to ≤ 49 W	≥ 0.0834 × ln(Pno) − 0.0014 × Pno + 0.609		N/A
49W < to ≤ 250W	≥ 0.870		N/A
> 250W	≥ 0.875		N/A
Nameplate Output Power (Pno)	**Maximum Power in No-Load Mode**		**Verdict**
	☐ **Ac-Ac EPS**	☐ **Ac-Dc EPS**	
≤ 1W	≤ 0.21W	≤ 0.10W	N/A
1 W < to ≤ 49 W	≤ 0.21W	≤ 0.10W	N/A
49W < to ≤ 250W	≤ 0.21W		N/A
> 250W	≤ 0.50W		N/A

Note(s):

1. Required Minimum Efficiency in Active Mode is 0.880.
2. Where Ln (Nameplate Output) = Natural Logarithm of the nameplate output expressed in Watts.
3. An efficiency of 0.88 in decimal form corresponds to the more familiar value of 88%.
4. A low voltage model is an EPS with a nameplate output voltage of less than 6 volts and a nameplate output current greater than or equal to 550 milliamps.

EU Energy-related Products (ErP) directive

Ecodesign requirements

set out in Annex II, 1 a) 1 b) of COMMISSION REGULATION (EU) No 2019/1782

for no-load electric power consumption and average active efficiency of external power supplies from 1 April 2020

AC-DC or AC-AC external power supplies, except low voltage external power supplies			
Nameplate Output Power (Po)	**Minimum Average Efficiency in Active Mode**		**Verdict**
≤ 1.0W	≥ 0.5 × PO/1W+ 0.160		N/A
1 W < Po ≤ 49.0 W	≥ 0.071 × ln(PO/1W) – 0.0014 × PO/1W+ 0.67		N/A
> 49.0 W	≥ 0.880		P
Nameplate Output Power (Po)	**Maximum Power in No-Load Mode**		**Verdict**
	☐ **AC-AC EPS**	☒ **AC-DC EPS**	
≤ 49.0 W	≤ 0.21W	≤ 0.10W	N/A
> 49.0 W	≤ 0.21W	≤ 0.21W	P
Low voltage external power supplies			
Nameplate Output Power (Po)	**Minimum Average Efficiency in Active Mode**		**Verdict**
≤ 1.0W	≥ 0.517 × PO/1W+ 0.087		N/A
1 W < Po ≤ 49.0 W	≥ 0.0834 × ln(PO/1W) – 0.0014 × Po/1W+ 0.609		N/A
> 49.0 W	≥ 0.870		N/A
Nameplate Output Power (Po)	**Maximum Power in No-Load Mode**		**Verdict**
≤ 49.0 W	≤ 0.10W		N/A
> 49.0 W	≤ 0.21W		N/A

Note(s):

1. Required Minimum Efficiency in Active Mode is 0.880.
2. Where Ln (Nameplate Output) = Natural Logarithm of the nameplate output expressed in Watts.
3. An efficiency of 0.88 in decimal form corresponds to the more familiar value of 88%.
4. A low voltage model is an EPS with a nameplate output voltage of less than 6 volts and a nameplate output current greater than or equal to 550 milliamps.

EU Code of Conduct – Version 5, 29 October 2013

for no-load electric power consumption and average active efficiency of external power supplies

Table 1.1: No-load Power Consumption

Nameplate Output Power (Pno)	Maximum Power in No-Load Mode	Verdict
	Effective dates: ***Tier 2*** *after 1 January 2016*	N/A
≥ 0.3W and < 49W	≤ 0.075 W	N/A
≥ 49 and < 250 W	≤ 0.150 W	P
Mobile handheld battery driven and < 8 W	≤ 0.075 W	N/A

Table 2.1: Energy-Efficiency Criteria for Active Mode (excluding Low Voltage external power supplies)

Nameplate Output Power (Pno)	Minimum Four Point Average Efficiency in Active Mode	Verdict
	Effective dates: ***Tier 2*** *after 1 January 2016*	N/A
0.3 ≤ W ≤ 1	≥ 0.500 * Pno + 0.169	N/A
1 < W ≤ 49	≥ 0.071 * ln(Pno) – 0.00115 * Pno + 0.670	N/A
49 < W ≤ 250	≥ 0.890	P
Nameplate Output Power (Pno)	**Minimum Efficiency in Active Mode at 10 % load of full rated output current**	**Verdict**
	Effective dates: ***Tier 2*** *after 1 January 2016*	N/A
0.3 ≤ W ≤ 1	≥ 0.500 * Pno + 0.060	N/A
1 < W ≤ 49	≥ 0.071 * ln(Pno) – 0.00115 * Pno + 0.570	N/A
49 < W ≤ 250	≥ 0.790	P

Note(s):

1. Required Minimum Efficiency in Active Mode is 0.890.
2. Where Ln (Nameplate Output) = Natural Logarithm of the nameplate output expressed in Watts.
3. An efficiency of 0.88 in decimal form corresponds to the more familiar value of 88%.

Table 2.2: Energy-Efficiency Criteria for Active Mode for Low Voltage external power supplies

Nameplate Output Power (Pno)	**Minimum Four Point Average Efficiency in Active Mode**	**Verdict**
Effective dates: ***Tier 2*** *After 1 January 2016*		N/A
0.3 ≤ W ≤ 1	≥ 0.517 * Pno + 0.091	N/A
1 < W ≤ 49	≥ 0.0834 * ln(Pno) – 0.0011 * Pno + 0.609	N/A
49 < W ≤ 250	≥ 0.880	N/A
Nameplate Output Power (Pno)	**Minimum Efficiency in Active Mode at 10 % load of full rated output current**	**Verdict**
Effective dates: ***Tier 2*** *after 1 January 2016*		N/A
0.3 ≤ W ≤ 1	≥ 0.517 * Pno	N/A
1 < W ≤ 49	≥ 0.0834 * ln(Pno) – 0.00127 * Pno + 0.518	N/A
49 < W ≤ 250	≥ 0.780	N/A

Note(s):

1. Where Ln (Nameplate Output) = Natural Logarithm of the nameplate output expressed in Watts.
2. An efficiency of 0.88 in decimal form corresponds to the more familiar value of 88%.
3. A low voltage model is an EPS with a nameplate output voltage of less than 6 volts and a nameplate output current greater than or equal to 550 milliamps.

External power supplies must carry a verification mark indicating that the energy performance of the product has been verified. The verification mark is the mark of a Standards Council of Canada accredited certification organization that administers an energy performance verification program for this product.

NRCan will also accept the use of the Roman Numeral as an alternative to the energy efficiency verification mark if the Roman Numeral is clearly indicated on the product according to the international efficiency marking protocol (see table below) and if the product performance is initially verified by an Standards Council of Canada accredited certification organization with a relevant energy efficiency scope (i.e. offering an EPS energy efficiency verification program.)

International Efficiency Marking Protocol for External Power Supplies
Version 3.0, September 2013

Mark	Performance Requirements				
	Nameplate Output Power (Pno)[2]	**No-Load Mode Power[3]**	**Nameplate Output Power (Pno)**	**Average Efficiency in Active Mode[4]**	**Power Factor**
I	Used if none of the other criteria are met.				
II	0 to ≤ 10 watts	≤ 0.75	0 to < 1 watt	≥ 0.39 * P_{no}	Not applicable
	> 10 to 250 watts	≤ 1.0	1 to < 49 watts	≥ 0.107 x Ln(P_{no}) + 0.39	
			> 49 watts	≥ 0.82	
III	0 to < 10 watts	≤ 0.5	0 to 1 watt	≥ 0.49 * P_{no}	Not applicable
	10 to 250 watts	≤ 0.75	> 1 to < 49 watts	≥ 0.09 * Ln(P_{no}) + 0.49	
			> 49 to 250 watts	≥ 0.84	
IV	0 to 250 watts	≤ 0.5	0 to 1 watt	≥ 0.5 * P_{no}	Not applicable
			1 to 51 watts	≥ 0.09 * Ln(P_{no}) + 0.5	
			> 51 to 250 watts	≥ 0.85	
V	0 to < 50 watts	≤ 0.5 for ac-ac; ≤ 0.3 for ac-dc	0 to ≤ 1 watt	Standard: ≥ 0.480 * P_{no} + 0.140 Low Voltage: ≥ 0.497 * P_{no} + 0.067	EPSs with ≥ 100 watts input power must have a true power factor ≥ 0.9 at 100% of rated load when tested at 115 volts/60Hz.
			> 1 to 49 watts	Standard: ≥ [0.0626 * Ln(P_{no})] + 0.622 Low Voltage: ≥ [0.0750 * Ln(P_{no})] + 0.561	
	≥ 50 to ≤ 250 watts	≤ 0.5	> 49 to 250 watts	Standard: ≥ 0.870 Low Voltage: ≥ 0.860	
VI	Single-Voltage				Not Applicable
	0 to ≤ 49 W	AC-DC: ≤ 0.100 AC-AC: ≤ 0.210	0 to ≤ 1 W	Basic Voltage: ≥ 0.5 * P_{no} + 0.16 Low Voltage: ≥ 0.517 * P_{no} + 0.087	
			1 to ≤ 49 W	Basic Voltage: ≥ 0.071* ln(P_{no}) − 0.0014*P_{no} + 0.67 Low Voltage: ≥ 0.0834 * ln(P_{no}) − 0.0014 * P_{no} + 0.609	
	>49 to ≤ 250 W	≤ 0.210	>49 to ≤ 250 W	Basic Voltage: ≥ 0.880 Low Voltage: ≥ 0.870	
	> 250 W	≤ 0.500	>250 W	≥ 0.875	
	Multiple-Voltage				
	Any	≤ 0.300	0 to ≤ 1 W	≥ 0.497 * P_{no} + 0.067	
			1 to ≤ 49 W	≥ 0.075 * ln(P_{no}) + 0.561	
			49 W	≥ 0.860	
VII	Reserved for future use				

[2] Pno is the Nameplate Output Power of the unit under test.
[3] In Australia and New Zealand, AC-AC external power supplies are not required to meet the no-load mode power requirements.
[4] "ln" refers to the natural logarithm.
[5] A low-voltage model is an EPS with nameplate output voltage of less than 6 volts and nameplate output current greater than or equal to 550 milliamperes. A basic-voltage model is an EPS that is not a low-voltage model.

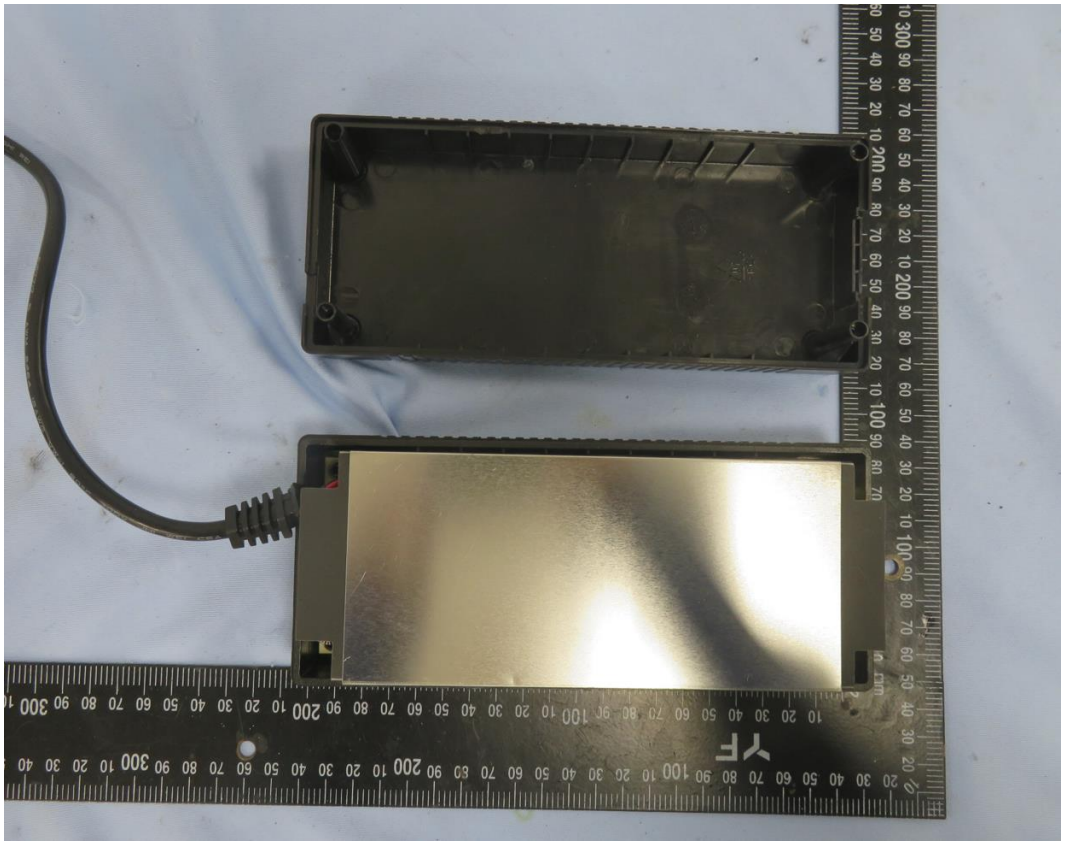
Appendix 1 – Photographs



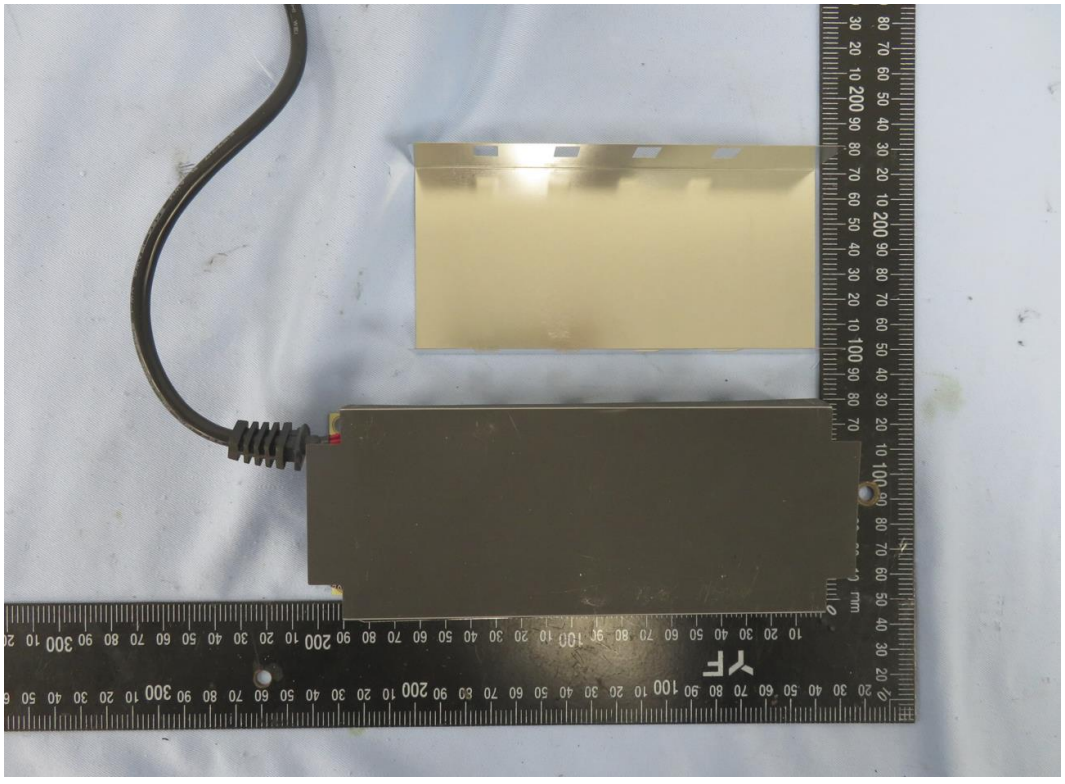
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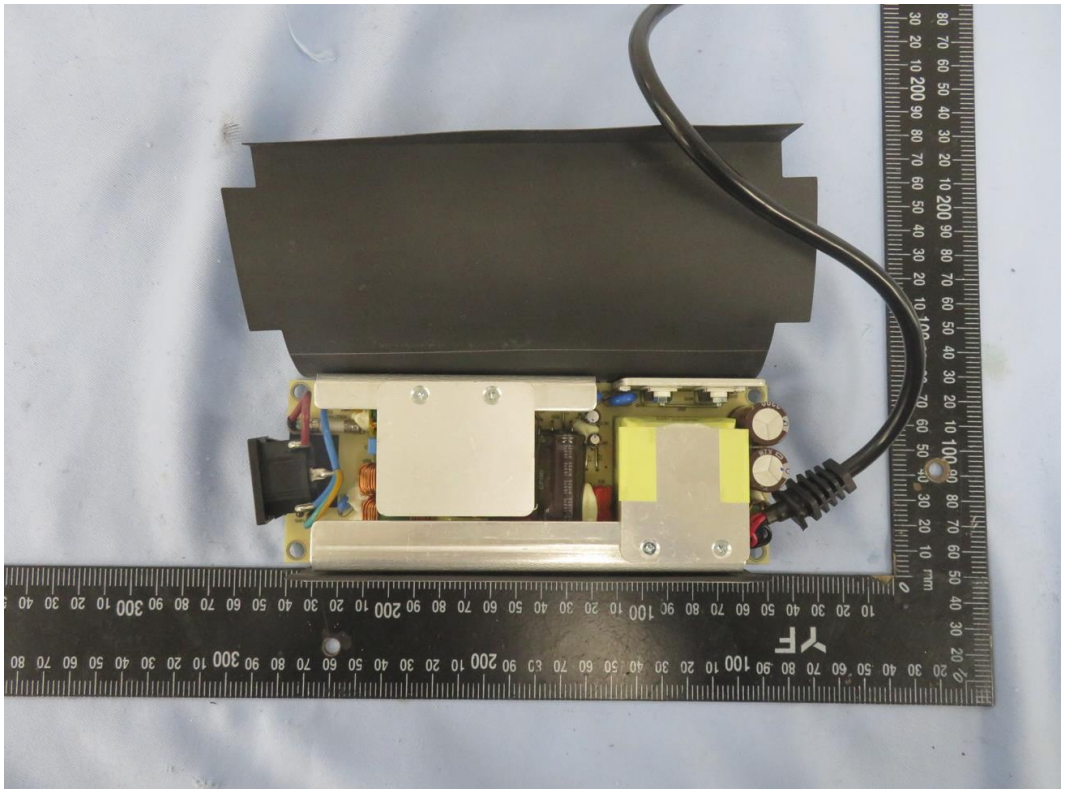
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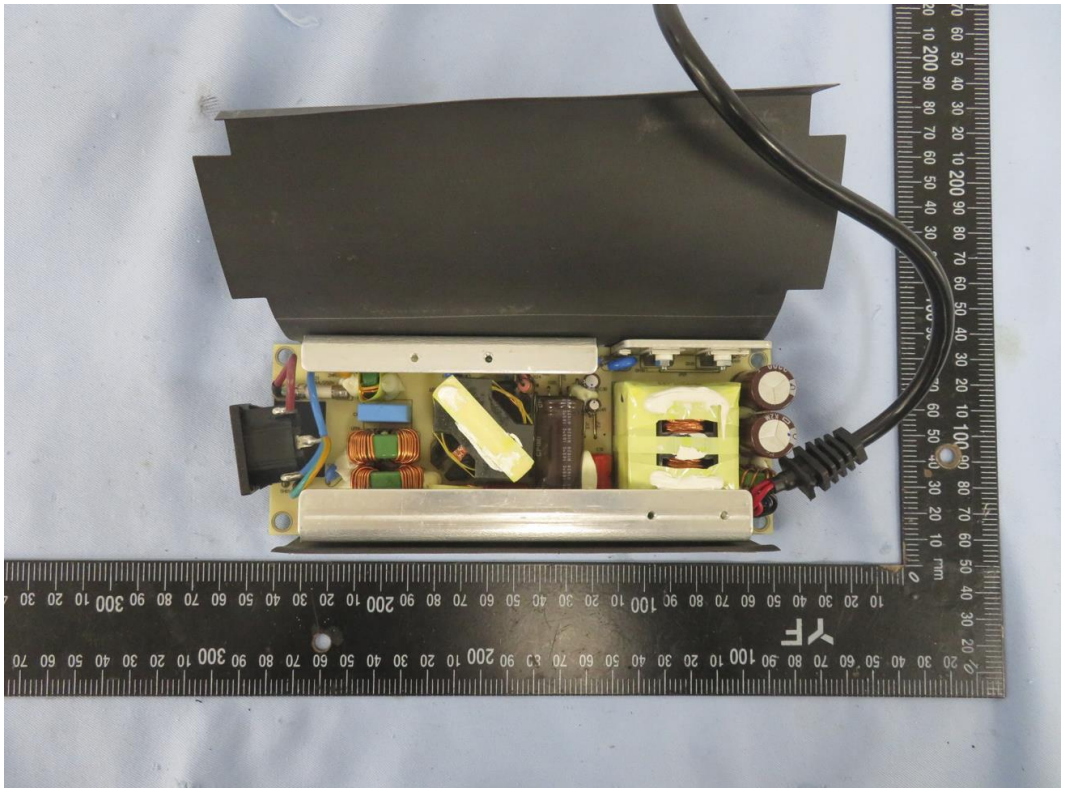
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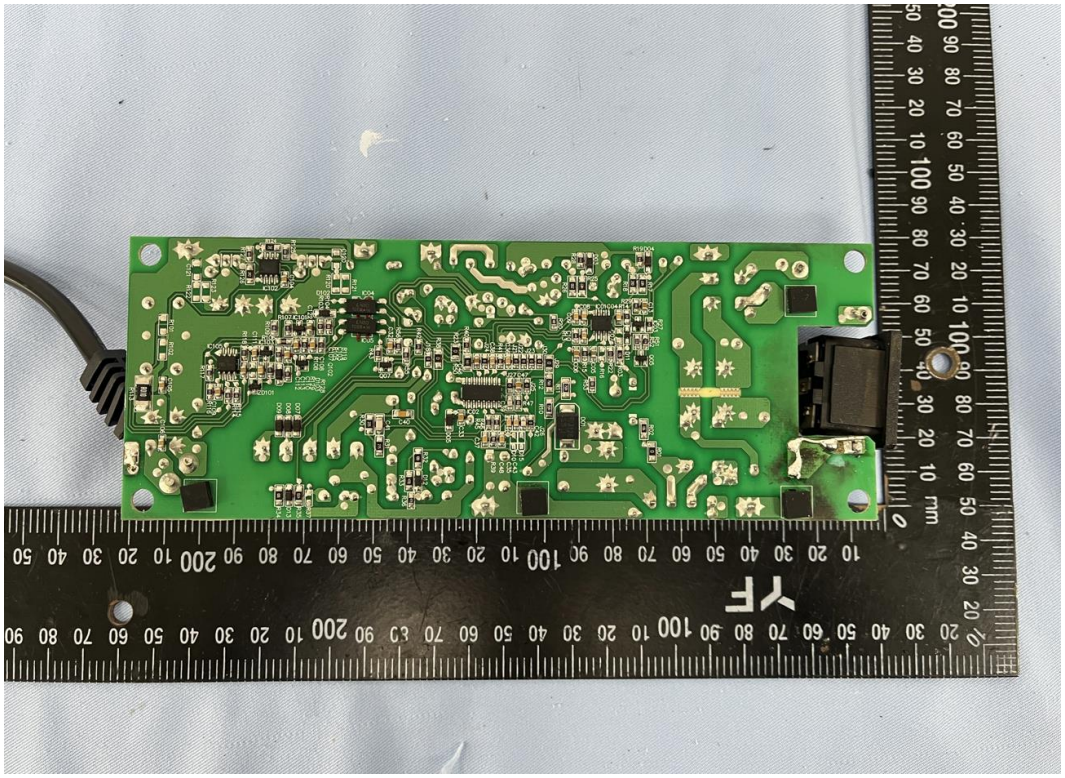
Picture 4



Picture 5



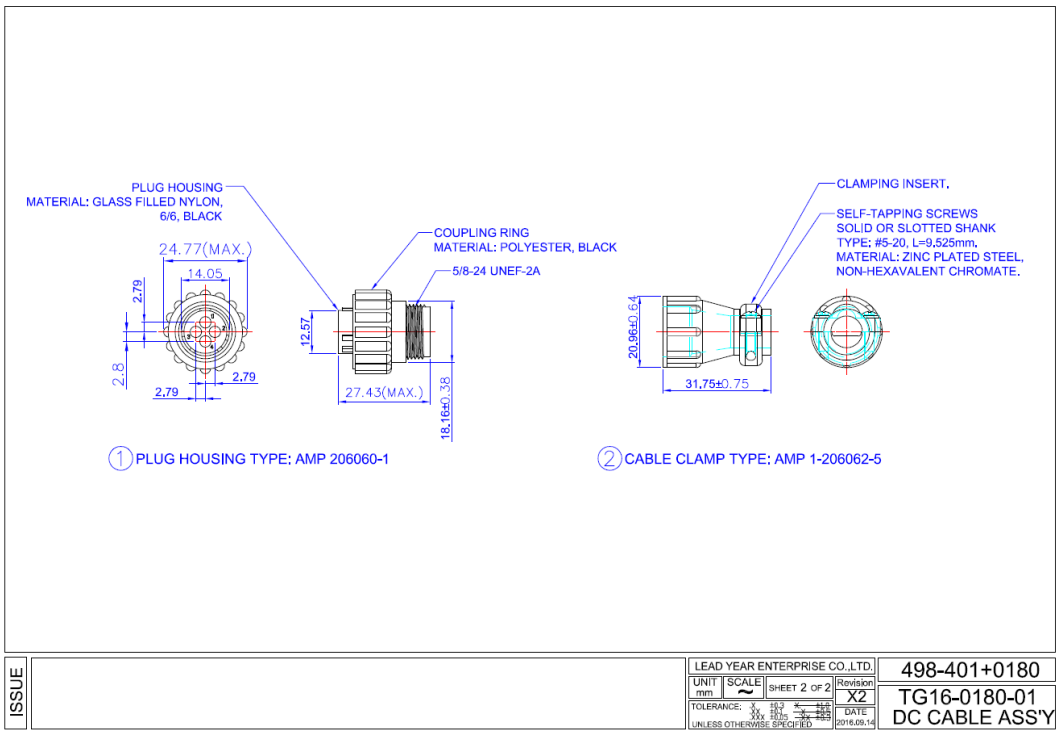
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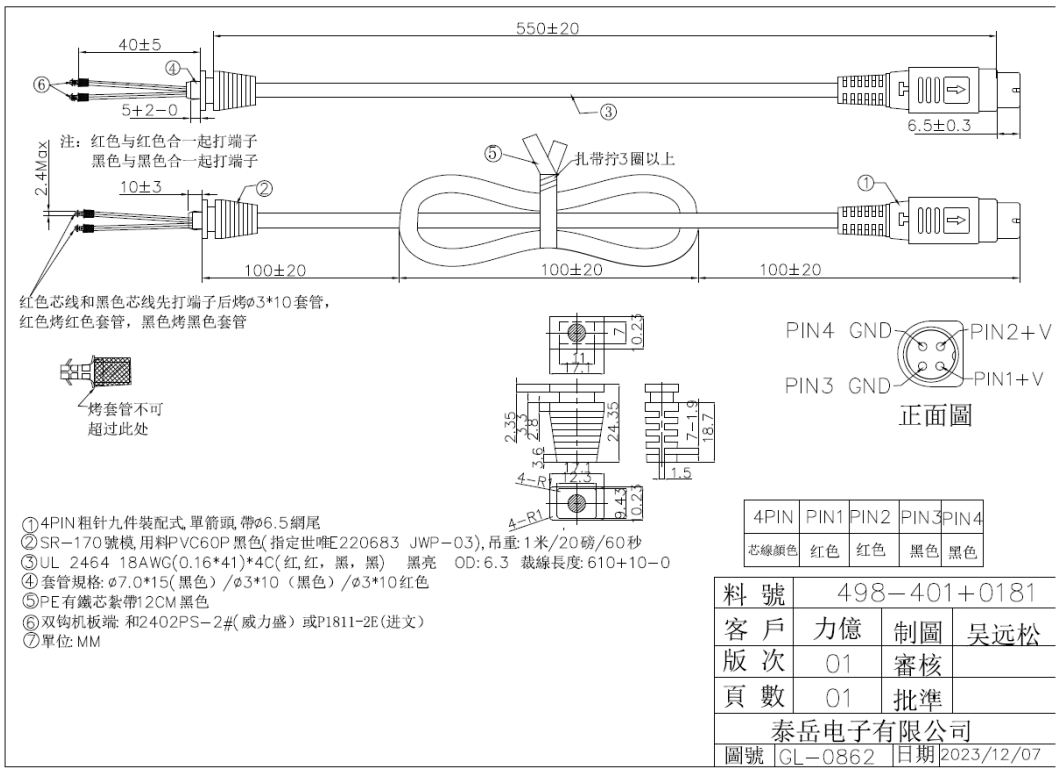
Picture 7



Picture 8 Output cord



Picture 9 Specification of Output cord



Picture 10 Specification of Output cord

Appendix 2 – Test Equipment List

ID#	Type	Model	Calibration Date	
			Last (dd/mm/yyyy)	Due (dd/mm/yyyy)
05-2017-0073	Wind speed meter	Testo 425	20/09/2023	19/09/2024
GC-TW001317	Multifunctional AC Power Supply	EAB-120	N/A	N/A
GC-TW001319	Power Meter & USB . GPIB Interface	WT310E	24/08/2023	23/08/2024
GC-TW005678	DC Electronic Load	3311F-16	14/09/2023	13/09/2024
890	Timer	HS-30W	09/05/023	08/05/024
GC-TW001908	Digital Multimeters	DMM4040	19/10/2023	18/10/2024
GC-TW001909	Digital Multimeters	DMM4040	19/10/2023	18/10/2024
GC-TW003598	Thermometer Hygrometer Data Logger	S3120	14/03/2024	13/03/2025
None	Measurement Tape	Proskit, Proskit	24/11/2022	23/11/2025
Note:				

End of Test Report