

Certificate of Conformance

Energy Efficiency Certification

UL conducted an independent evaluation on behalf of:

Mean Well Enterprises Co., Ltd.

No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 24891 Taiwan

for the following products:

External Power Supply

Brand:



Model Number:
See appendix

This product meets all of the necessary qualifications pursuant to:

NRCan: Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II

US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609

US DoE: Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430

EU Directive for Energy-related Products ErP 2009/125/EC and Implementing Measure (IM) no. EC278/2009 for External Power Supply Australian (Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014) and New Zealand (Minimum energy performance standards)

EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5

Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances

International Efficiency Marking Protocol for External Power Supplies, Version 3.0, Level VI



2015-11-30

Certification Date

2019-08-02

Certification Revision Date

Issued by

See note for detail

UL Product Number

Certificate of Conformance

Appendix

Model Number:

GST36B05, GST36E05, GST36U05, GST36B09, GST36E09, GST36U09, GST36B12,
GST36E12, GST36U12, GST36B24, GST36E24, GST36U24, GST36B48, GST36E48,
GST36U48

Note:

- 1) 4786997669 BA1, 4788995393-a
- 2) 4786997669 BA2, 4788995393-b
- 3) 4786997669 BA3, 4788995393-c
- 4) 4786997669 BA4, 4788995393-d
- 5) 4786997669 BA5, 4788995393-e



2015-11-30

Certification Date

2019-08-02

Certification Revision Date

A handwritten signature in black ink, appearing to read 'David R. Smith'.

Issued by

See note for detail

UL Product Number



ENERGY EFFICIENCY CERTIFICATION (EEC): Test Report - Cover Page

Customer Name: Mean Well Enterprises Co., Ltd.

Address: No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 24891 Taiwan

Brand Name(s):



Model Number(s): GST36B05, GST36E05, GST36U05

Product Category: EXTERNAL POWER SUPPLY

Representative (tested) Model: GST36B05

Model Differences: All models are identical except for model designation

The sample(s) tested is(are) compliant with the following applied standards/regulations:

NRCan: Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II

US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609

US DoE: Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430

EU Directive for Energy-related Products ErP 2009/125/EC and Implementing Measure (IM) no. EC278/2009 for External Power Supply

Australian (Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014) and New Zealand (Minimum energy performance standards)

EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5

Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances

Test Location Name: MEAN WELL ENTERPRISES CO., LTD.

Test Location Address: 28 WUQUAN 3RD RD, WUGU DISTRICT, NEW TAIPEI, 248, TAIWAN

Testing Performed Under: ☐ UL Lab ☐ Private Label
☐ CTDP/SMTL ☒ WMTL ☐ EPA 3rd Party

UL Project No.: 4786997669 BA1, 4788995393-a

Project Handler: Hans Chen

Issued: 2015-11-30

(yyyy-mm-dd)

Reviewed by: Evy Chang / Jasmin Wang

Revised: 2019-08-02

(yyyy-mm-dd)

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ATTACHMENT(S)

- Results Summary of International Efficiency Marking Protocol.
- Model(s) GST36B05, GST36E05, GST36U05 are Direct Operation, AC-DC, Low-Voltage type EPS.

Test	Result	Compliant, Y/N
The roman numeral mark of International efficiency marking protocol, if applicable	VI	Yes

Label information:



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Annex A1

Regulatory Body	Test Method, Regulation or Program Evaluated to	Test Limit per Regulation or Program Requirement		Measurements		Other
		Average Efficiency In Active Mode	No-Load Mode Power	Average Efficiency In Active Mode	No-Load Mode Power	
NRCan	10 CFR Parts 429 and 430	≥ 83.5 %	≤ 0.1 W	*85.67 %	**0.030 W	Complied
DoE	10 CFR Parts 429 and 430	≥ 83.5 %	≤ 0.1 W	*85.67 %	**0.030 W	Level VI
CEC	Appliance Efficiency Regulations, Sections 1601 through 1609	≥ 83.5 %	≤ 0.1 W	*85.67 %	**0.030 W	Complied
ErP	Annex I(b) Of 2009/125/EC and Commission Regulation (EC) No 278/2009	≥ 79.1 %	≤ 0.3 W	85.63 %	0.0306 W	Complied
Australian (GEMS) and New Zealand	AS/NZS4665.1-2005+A1:2009; AS/NZS4665.2-2005+A1:2009	≥ 79.1 %	≤ 0.3 W	85.45 %	0.030 W	'High efficiency' performance mark V; Mark VI mentioned in the IEMP
CoC	Energy Efficiency of External Power Supplies Version 5	≥ 84.1 % ≥ 74.7 % @10% load	≤ 0.075 W	85.45 % 82.42 %	0.0324 W	Complied
Quebec	10 CFR Parts 429 and 430	≥ 83.5 %	≤ 0.1 W	*85.67 %	**0.030 W	Complied

Additional Information:

See Energy Efficiency Laboratory Data Package of Project No: 4786997669 BA1 for further details and test results.

N/A = Not Applicable

* According to 10 CFR SUBPART B of PART 429.37 sampling plan for Active Mode:

LCL/0.95=89.975, Mean=85.748, n=3, 83.5 ≤ certified rating ≤ 85.748 (%), Certified rating is for registration purpose.

** According to 10 CFR SUBPART B of PART 429.37 sampling plan for No-Load Mode:

UCL/1.05=0.0292, Mean=0.0232, n=3, 0.1 W ≥ certified rating ≥ 0.0292 W, Certified rating is for registration purpose.

Project History:

For Project 4788995393-a:

1). Update regulations from NRCan: Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II to NRCan: Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II.

2). Update regulations from US CEC: Appliance Efficiency Regulations (California Code of Regulations, Title 20, Sections 1601 through 1608) dated July 2015 to US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609.

3). Update regulations from Australian (GEMS) and New Zealand : AS/NZS4665.1-2005+A1:2009 ; AS/NZS4665.2-

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2005+A1:2009 to Australian (Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014) and New Zealand (Minimum energy performance standards).

4) Update regulations from EU Code of Conduct on Energy Efficiency of External Power Supplies, Version 5 to EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5.

5). Adding regulations Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances.

6). Update customer information from Mean Well Enterprises Co., Ltd., address No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 248 Taiwan to Mean Well Enterprises Co., Ltd., address No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 24891 Taiwan.

- Test waived by engineering judgement, due to the test results is complied with Quebec and NRCan energy efficiency regulations.

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DATA PACKAGE INFORMATION SHEET

Applicant Information	Name / Address:	MEAN WELL ENTERPRISES CO., LTD. 28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 248 TAIWAN
-----------------------	-----------------	--

Product Information:	Standard(s):	☒	EU Directive for Energy-related Products ErP 2009/125/EC and Implementing Measure (IM) no. EC278/2009 for External Power Supply
		☒	EN50563-2011/A1:2013, External a.c. - d.c. and a.c. - a.c. power supplies – Determination of no-load power and average efficiency of active modes
		☒	EN50564-2011, Electrical and electronic household and office equipment - Measurement of low power consumption
		☐	Other:
	CCNs:	ENVP	
	Product Name/Type:	External Power Supply ☒ AC-DC ☐ AC-AC	
Model(s):	GST36B05		

Test Location Information	DAP and UL: ☐ CTD ☐ TCP ☐ TPTDP ☒ WTDP ☐ UL		
	Test Location Name/Address: MEAN WELL ENTERPRISES CO., LTD. 28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 248 TAIWAN		
	Tests Conducted By**:	Sign	Frank Lin
		Print	Frank Lin
	**When all tests are conducted by one person, the printed name and signature can be inserted here instead of on each page containing data.		
	Authorized Signatory or TCP Reviewer:	Sign	--
		Print	--
		Date	--
	UL WTDP / WMT Witness:	Sign	Eddie Lu
Print		Eddie Lu	

Reviewed & Accepted	Qualified Project Handler:	Sign	Tina Lien / Amos Chen
		Print	Tina Lien / Amos Chen

LIST OF TESTS

<u>Test Name</u>	<u>Page</u>
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TECHNICIAN’S REFERENCE PAGE.....	8
ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:.....	11
WORKSHEETS.....	12

Special Instructions:

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

Standard	Ambient Temperature °C	Relative Humidity RH %	Supply Voltage Tolerance%	Total Harmonic Distortion THD %	Airspeed, room m/s	Supply Frequency Tolerance %
--	23±5	10-80	±1	<2	≤0.5	±1

Per test standard EN50564, sub-clause 4.2, Where the product has an ambient light sensor that affects the power consumption, the test shall be carried out with controlled ambient light conditions. Where the illuminance levels are externally defined (in a test procedure or in the instructions for use), these values shall be used. Where no illuminance levels are stated or defined, reference illuminance levels of more than 300 lux and less than 10 lux shall be used.

Witness Test Data Program (WTDP) Information:**Environment:**

Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025 Clause 5.3.1, 5.3.2, 5.3.3)

☒ Yes ☐ No ☐ N/A

Equipment:

Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025 5.6.2.2)

☒ Yes ☐ No

Critical Consumables:

Critical consumables are compliant with test standard requirements. (ISO/IEC 17025 Clause 4.6)

☐ Yes ☐ No ☒ N/A

Sample Identification:

Identification of items to be tested has been made (e.g. model no., Serial No., etc.) (See Test Sample Identification page and ISO/IEC 17025 Clause 5.8.2)

☒ Yes ☐ No

Summary:

The test facility was deemed to have the environment and capabilities necessary to perform the tests included in this data package.

☒ Yes ☐ No

TEST INSTRUMENTS REFERENCE LIST

Instr. Code	Instrument I.D.	Instrument Type	Range Used Or ***	Make and Model **	Calibration Date	
					Last	Due
11	6314A0001880	DC Electronic Load	Max.80V,60A	Chroma / 6314A+, 63103A	2015-04-17	2016-04-16
17	662022004344	Digital Power Meter	600V, 20A, 63Hz	Chroma / 66202	2015-04-17	2016-04-16
25	ACS002	Frequency Converter	47/50/60/120/120/240/450Hz	Chroma / 6530	2015-06-08	2016-06-07
26	Q887652	Anemometer	0.50 m/s ~ 20.0 m/s	Lutron / AM-4214SD	2015-08-07	2016-08-06
27	15250924	Thermo-Hygrograph	10°C ~ +40°C 30%~80%RH	OMEGA / iTHX-SD	2018-08-18	2016-08-17
UL-PA066	91LC35759	Power Analyzer	V:15/30/60/150/300/600(AC/DC) A:5mA/10mA/20mA/50mA/100mA/200mA/ 0.5A/1A/2A/5A/10A/20A(AC/DC) Harmonics:Full Range W:Full Range P.F.:Full Range	YOKOGAWA / WT210	2015-02-06	2016-02-29
UL-PA078	91N114682	Power Analyzer	V:15/30/60/150/300/600(AC/DC) A:5mA/10mA/20mA/50mA/100mA/200mA/ 0.5A/1A/2A/5A/10A/20A(AC/DC) W:Full Range P.F.:Full Range	YOKOGAWA / WT210	2015-02-06	2016-02-29

~~"Chamber setting(s) ☐ was ☐ were monitored to ensure that the setting(s) ☐ was ☐ were stable throughout the test time frame. Any deviations from the setting(s) are noted below.~~

Date	Test	Instrument Code	Time period of deviation	Setting(s)
N/A	N/A	N/A	N/A	N/A

--	--	--	--	--

** Information to be recorded when tests are conducted at a non-UL facility.

*** Refer to specific data sheet for individual scale used.

- ☐ Test equipment information is recorded on UL's Laboratory Project Management (LPM)/Laboratory Equipment Management (LEM) database. (This statement may be selected only if datasheets are completed at a UL facility)

POWER SUPPLY REFERENCE PAGE

Product Name/Type:	External AC/DC Power Supply (EPS)
Manufacturer:	MEAN WELL ENTERPRISES CO., LTD.
Brand Name:	
Model Number/Designation:	GST36B05
Existing Roman Numeral Marking, if marked (i.e. III, IV, V)	VI

Nameplate Rating:	Input:	100-240VAC, 50/60HZ, 0.8A
	Output:	5Vdc,4.3A

Each sample was tested at:	☒ 230V, 50Hz		
UUT Output Cord Length (± 1 cm):	100		
Presence of Input Power Switch (Y/N):	☐ Yes	☒ No	
Input Power Switch (ON/OFF):	☐ ON	☐ OFF	☒ N/A
UUT is a Standard/Low Voltage Type:	☐ Standard	☒ Low Voltage	☐ N/A
End Product Powered by the UUT:	N/A		

Notes/Comments: N/A

TECHNICIAN'S REFERENCE PAGE

DEFINITIONS

“UUT”: UUT is any acronym for “Unit Under Test”

“Low Voltage External Power Supply”: An external power supply (EPS) with a nameplate output voltage of less than 6 volts and a nameplate output current greater than or equal to 550 milliamps.

“Active Mode”: The condition in which the input of a power supply is connected to line voltage ac and the output is connected to an ac or a dc load drawing a fraction of the power supply's nameplate power output greater than zero.

“Active Mode Efficiency”: The ratio, expressed as a percentage, of the total active output power (ac or dc) produced by a power supply to the active input power (ac) required to produce the total active output power.

“No-Load Mode”: The condition in which the input of a power supply is connected to an ac source consistent with the power supply's nameplate ac voltage, but the output is not connected to a product or any other load.

“Power Factor (True)”: The true power factor is the ratio of the active or real power (P) consumed in watts to the apparent power (S), drawn in volt-amperes (VA).

$$PF = P/S$$

POWER MEASUREMENTS

All power figures should be in watts and rounded to the second decimal place. For loads greater than or equal to 10 W, three significant figures shall be reported.

INPUT METER CONSIDERATIONS

The power measurement instrument shall have a resolution of:

- 0.01 W or better for power measurements of 10 W or less;
- 0.1 W or better for power measurements of greater than 10 W up to 100 W; and
- 1 W or better for power measurements of greater than 100 W.

The following attributes in addition to those above are suggested for the input power meter:

- Frequency response of at least 3 kHz.

TECHNICIAN'S REFERENCE PAGE (Cont'd)

INSTRUCTIONS – TEST PREPARATION AND LOADING

“Built-in switch”: if a built-in switch in the UUT control power flow to the ac input, it shall be ON position for measurement.

“Output Cord”: the UUT must be tested with the output cord supplied by the manufacturer.

Metering equipment shall be connected to the output of the power supply by:

- Cutting the cord immediately adjacent to the output connector
- Attaching leads and measuring the efficiency from the output connector itself

Where the UUT is directly connected to the end product that it is powering, the cord immediately adjacent to the powered product shall be cut and output measurement probes shall be connected at that point.

“UUT with more than 2 output wires”: in similar cases, the tests shall be conducted on two output wires that supply power to the product. The other output wires (i.e.: used for battery monitoring) shall be left disconnected.

“UUT with switchable output”: in similar cases, the UUT shall be tested for each output voltage, one at a time.

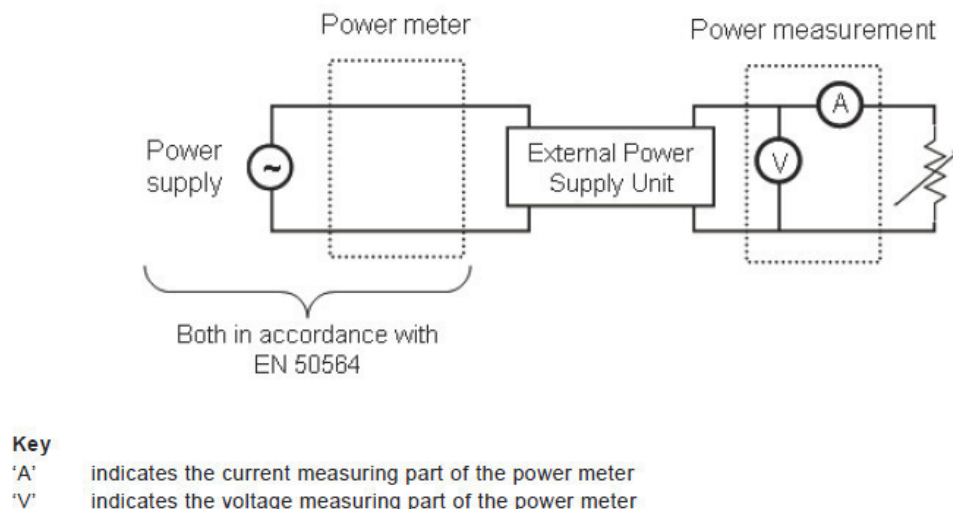
“Loading”: A set of variable Resistive of Electronics Loads shall be used to load the power supply to produce the four active-mode load conditions specified in Table 1 (Load Conditions 1 to 4). While this load may differ from the electronic loads that EPS are designed to power, they provide standardized and repeatable references for testing and product comparison.

When an Electronic Load is used for the output loading, the desired output current should be adjusted in constant current (CC) mode rather than adjusting the required output power in constant power (CP) mode.

When a Resistive Load is used, it needs to be measured precisely with an ohmmeter, a variable resistor may be adjusted to the point where an ammeter confirms that the desired percentage of nameplate output current is flowing through the load.

Figure A1 shows an external power supply test set-up using a variable resistance as the load.

Figure A1 – Generic test set-up using a variable resistive load



ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:**TESTING SEQUENCE:**

The UUT shall be tested at each load condition specified in Table 1, testing consecutively from Load Condition 1 (100% Load) to Load Condition 5 (No-Load).

The UUT shall be operated at 100% of nameplate current output (Table 1: Load Conditions 1) for at least 30 minutes warm-up period then immediately prior to conducting efficiency measurements

After warm-up period, the technician shall monitor AC input power for a period of 5 minutes to assess the stability of the UUT.

1. If the power level does not change by more than 5% from the maximum value observed, the UUT can be considered stable and the indicated measurements can be recorded at the end of the 5 minute period.
2. If ac input power is not stable over a 5 minute period, stability shall be determined in accordance with EN 50564:2011, clause 5.3.(Note: EN50564:2011, 5.3.1 – Sampling Method)

Note: If load condition 1 cannot be maintained for the warm-up period or the stability period then compliance with this standard cannot be determined.

While the unit operates under each of the subsequent Load Conditions from 2 to 5 (See Table 1) for a period of time not necessary to repeat warm-up period, the technician shall record all the indicated measurements for each Load Condition, as indicated as above item 1 or 2

Table 1 – Load Conditions and testing sequence

Load Conditions for UUT	Percentage of Nameplate Output Current	Warm-up period by Load Conditions [minutes]	Assessment period after warm-up [minutes]
1	100% $\pm$ 2% ⁽¹⁾	30	5
2	75% $\pm$ 2%	0	5
3	50% $\pm$ 2%	0	5
4	25% $\pm$ 2%	0	5
5	0%	0	5
Note(s): ⁽¹⁾ The 2% allowance is of nameplate output current, not of the calculated current value. For example, a UUT at Load Condition 3 may be tested in a range from 48% (min) to 52% (max) of rated output current.			

EN50564-2011: Clause 5.3.1 – Sampling Method

Where the power consumption within a mode is not cyclic, the average power is assessed as follows:

1. The product shall be energized for not less than 15 min; this is the total period;
2. Any data from the first one third of the total period is always discarded. Data recorded in the second two thirds of the total period is used to determine stability;
3. Establishment of stability depends on the average power recorded in the second two thirds of the total period. For input powers less than or equal to 1 W, stability is established when a linear regression through all power readings for the second two thirds of the total period has a slope of less than 10 mW/h. For input powers of more than 1 W, stability is established when a linear regression through all power readings for the second two thirds of the total period has a slope of less than 1 % of the measured input power per hour.
4. Where a total period of 15 min does not result in the above stability criteria being satisfied, the total period is continuously extended until the relevant criteria above is achieved (in the second two thirds of the total period).
5. Once stability is achieved, the result is taken to be the average power consumed during the second two thirds of the total period.

NOTE: If stability cannot be achieved within a total period of 3 h, the raw data should be assessed to see whether there is any periodic or cyclic pattern present.

Where the power consumption within a mode is cyclic (i.e. a regular sequence of power states that occur over several minutes or hours), the average power over a minimum of four complete cycles is assessed as follows:

1. The product shall be energized for an initial operation period of not less than 10 min. Data during this period is not used to assess the power consumption of the product;
2. The product is then energized for a time sufficient to encompass two comparison periods, where each period shall include not less than two cycles and have a duration of not less than 10 min (comparison periods must contain the same number of cycles);
3. Calculate the average power for each comparison period;
4. Calculate the mid-point in time of each comparison period in hours;
5. Stability is established where the power difference between the two comparison periods divided by the time difference of the mid-points of the comparison periods has a slope of less than
 - 10 mW/h, for products where the input powers is less than or equal to 1 W; or
 - 1 % of the measured input power per hour, for products where the input powers is greater than 1 W
6. Where the above stability criteria is not satisfied, additional cycles are added equally to each comparison period until the relevant criteria above is achieved
7. Once stability is achieved, the power is determined as the average of all readings from both comparison periods.

Note: Where cycles are not stable or are irregular, sufficient data shall be measured to adequately characterize the power consumption of the **mode** (a minimum of 10 cycles is recommended).

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-10-26
signature print
Sample #: 0924002-1 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS: (Cont'd)

Ambient Temperature (°C): 23.6 Relative Humidity (%): 64.9 Airspeed, room (m/s) : <0.2
Sample No.: 1
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 4.3

	External Power Supply Input Electric Data										Power Supply [DC] Output		
Load #	V	HZ	A	PF	THD	5 Minutes Stability Assessment %	*Stability value from Sampling or average power method if UUT failed 5 minute stability assessment	**Avg. Power (W)	Uncertainty of the equipment (Ue)	Interval [min]	V	A	**Avg. Power (W)
1 (100%)	229.62	50.00	0.274	0.40	0.22	0.08	--	25.1832	*	5	4.99	4.29	21.4320
2 (75%)	229.63	50.00	0.210	0.39	0.20	0.11	--	18.8376	*	5	5.02	3.23	16.2168
3 (50%)	229.63	50.00	0.146	0.38	0.18	0.08	--	12.6492	*	5	5.04	2.15	10.8468
4 (25%)	229.63	50.00	0.080	0.35	0.15	0.10	--	6.3192	*	5	5.07	1.07	5.4096
5 (0%)	229.63	50.00	0.036	0.00	0.15	65.79	0.00000098	0.0306	*	10			

Efficiency of Power Supply					Power Consumed by UUT (W)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4	100%	75%	50%	25%	No Load
85.104	86.0874	85.751	85.60577	85.63710134	3.7512	2.6208	1.8024	0.9096	0.0306

The calculated measurement uncertainty(Ue) shall be checked out under 0%, 25%, 50%, 75% and 100% load conditions, results ☒comply ☐do not comply with the requirement addressed in EN50563/EN50564 (Annex D):

- Input Power, the result shall be less than 2% for powers of 0.5 W or greater, or 10 mW for powers of less than 0.5W
- Output Power, the result shall be less than 2% for powers of 1 W or greater, or 0.02W for powers of less than 1W

*Ue=0.36 % value addressed in uncertainly measurement report

Ue Calculation Notes: _____

WORKSHEETS (CONT'D)

EU Directive for Energy-related Products 2009/125/EC and Implementing Measure no. EC 278/2009 for External Power Supply

Table 2: Energy-Efficiency Criteria for AC-AC and AC-DC External Power Supplies in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum Average Efficiency in Active Mode (expressed as a decimal)
0 to ≤ 1 Watt	$\geq 0.480 * P_o + 0.140$
> 1 to ≤ 51 Watts	$\geq [0.063 * \ln(P_o)] + 0.622$
> 51 Watts	≥ 0.870

Note: All efficiency values shall be rounded to the hundredths place.

Table 3: Energy-Efficiency Criteria for AC-AC and AC-DC External Power Supplies in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum Average Efficiency in Active Mode (expressed as a decimal)
0 to ≤ 1 Watt	$\geq 0.497 * P_o + 0.067$
> 1 to ≤ 51 Watts	$\geq [0.0750 * \ln(P_o)] + 0.561$
> 51 Watts	≥ 0.860

Note: All efficiency values shall be rounded to the hundredths place.

☒ Base on Tables 2 & 3, the calculated Minimum Average Efficiency in Active Mode is: 0.791 (79.1 %)

☒ The measured Minimum Average Efficiency in Active Mode is the following:

Model:	GST36B05		
Nameplate Output:	5VDC, 4.3A		
Minimum Average Efficiency in Active Mode	Sample No.:	0924002-1	
	Input Voltage:	230V, 50Hz	
	Efficiency :	0.856 (85.6 %)	

Table 4: Power Consumption Criteria for No-Load

Nameplate Output Power (P_{no})	Maximum Power in No-Load		
	Ac-Ac EPS	Ac-Dc EPS	Low Voltage EPS
0 to < 51 watts	≤ 0.5 watts	≤ 0.3 watts	≤ 0.3 watts
≥ 51 watts	≤ 0.5 watts	≤ 0.5 watts	n/a

☒ The measured Maximum Power In No-Load Condition is the following:

Model:	GST36B05		
Nameplate Output:	5VDC, 4.3A		
Maximum Power In No-Load Condition	Sample No.:	0924002-1	
	Input Voltage:	230V, 50Hz	
	Power :	0.030 W	

 UUT ☒ complies ☐ does not comply with requirements in:

EU Directive for Energy-related Products 2009/125/EC and Implementing Measure no. EC278/2009 for External Power Supply

DATA PACKAGE INFORMATION SHEET

Applicant Information	Name / Address:	MEAN WELL ENTERPRISES CO., LTD. 28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 248TAIWAN	
-----------------------	-----------------	---	--

Product Information	Standard(s):	☒ "Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies" dated August 11, 2004 International Efficiency Marking Protocol for External Power Supplies	
		☒ NRCan: Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II	
		☒ US CEC: Appliance Efficiency Regulations (California Code of Regulations, Title 20, Sections 1601 through 1609) dated July 2015	
		☒ US DoE: Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430	
		☒ Australian (GEMS) and New Zealand : AS/NZS4665.1-2005+A1:2009; AS/NZS4665.2-2005+A1:2009	
		☒ EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5	
		☒ Mexico: Secretaría de Energía, Director General de la Comisión Nacional para el Uso Eficiente de la - Catálogo de equipos y aparatos para los cuales los fabricantes, importadores, distribuidores y comercializadores deberán incluir información sobre su consumo energético	
		☐ Other:	
CCNs:		ENVP	
Product Name/Type:		External Power Supply ☒ AC-DC ☐ AC-AC	
Model(s):		GST36B05	

Test Location Information	DAP and UL: ☐ CTDp ☐ TCP ☐ TPTDP ☒ WTDP ☐ UL		
	Test Location Name/Address: MEAN WELL ENTERPRISES CO., LTD. 28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 248TAIWAN		
	Tests Conducted By**:	Sign	Frank Lin
		Print	Frank Lin
	**When all tests are conducted by one person, the printed name and signature can be inserted here instead of on each page containing data.		
	Authorized Signatory or TCP Reviewer:	Sign	--
		Print	--
		Date	--
	UL WTDP / WMT Witness:	Sign	Eddie Lu
Print		Eddie Lu	

Reviewed & Accepted	Qualified Project Handler:	Sign	Tina Lien / Amos Chen
		Print	Tina Lien / Amos Chen

LIST OF TESTS

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Special Instructions:

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

Standard	Ambient Temperature °C	Relative Humidity RH %	Supply Voltage Tolerance%	Total Harmonic Distortion THD %	Airspeed, room m/s	Supply Frequency Tolerance %
--	23±5	10-80	±1	<2	≤0.5	±1

NOTE:

The input voltage source shall be capable of delivering at least 10 times the nameplate input power of the UUT (as is specified in IEEE 1515-2000).

Witness Test Data Program (WTDP) Information:**Environment:**

Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025 Clause 5.3.1, 5.3.2, 5.3.3)

☒ Yes ☐ No ☐ N/A

Equipment:

Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025 5.6.2.2)

☒ Yes ☐ No

Critical Consumables:

Critical consumables are compliant with test standard requirements. (ISO/IEC 17025 Clause 4.6)

☐ Yes ☐ No ☒ N/A

Sample Identification:

Identification of items to be tested has been made (e.g. model no., Serial No., etc.) (See Test Sample Identification page and ISO/IEC 17025 Clause 5.8.2)

☒ Yes ☐ No

Summary:

The test facility was deemed to have the environment and capabilities necessary to perform the tests included in this data package.

☒ Yes ☐ No

TEST INSTRUMENTS REFERENCE LIST

Instr. Code	Instrument I.D.	Instrument Type	Range Used Or ***	Make and Model **	Calibration Date	
					Last	Due
11	6314A0001880	DC Electronic Load	Max.80V,60A	Chroma / 6314A+, 63103A	2015-04-17	2016-04-16
17	662022004344	Digital Power Meter	600V, 20A, 63Hz	Chroma / 66202	2015-04-17	2016-04-16
25	ACS002	Frequency Converter	47/50/60/120/120/240/450Hz	Chroma / 6530	2015-06-08	2016-06-07
26	Q887652	Anemometer	0.50 m/s ~ 20.0 m/s	Lutron / AM-4214SD	2015-08-07	2016-08-06
27	15250924	Thermo-Hygrograph	10°C ~ +40°C 30%~80%RH	OMEGA / iTHX-SD	2018-08-18	2016-08-17
UL-PA066	91LC35759	Power Analyzer	V:15/30/60/150/300/600(AC/DC) A:5mA/10mA/20mA/50mA/100mA/200mA/ 0.5A/1A/2A/5A/10A/20A(AC/DC) Harmonics:Full Range W:Full Range P.F.:Full Range	YOKOGAWA / WT210	2015-02-06	2016-02-29
UL-PA078	91N114682	Power Analyzer	V:15/30/60/150/300/600(AC/DC) A:5mA/10mA/20mA/50mA/100mA/200mA/ 0.5A/1A/2A/5A/10A/20A(AC/DC) W:Full Range P.F.:Full Range	YOKOGAWA / WT210	2015-02-06	2016-02-29

"Chamber setting(s) ☐ was ☐ were monitored to ensure that the setting(s) ☐ was ☐ were stable throughout the test time frame. Any deviations from the setting(s) are noted below.

Date	Test	Instrument Code	Time period of deviation	Setting(s)
N/A	N/A	N/A	N/A	N/A

** Information to be recorded when tests are conducted at a non-UL facility.

*** Refer to specific data sheet for individual scale used.

- ☐ Test equipment information is recorded on UL's Laboratory Project Management (LPM)/Laboratory Equipment Management (LEM) database. (This statement may be selected only if datasheets are completed at a UL facility)

POWER SUPPLY REFERENCE PAGE (ENGINEERING TO COMPLETE)

Product Name/Type:	External AC/DC Power Supply (EPS)	
Manufacturer:	MEAN WELL ENTERPRISES CO., LTD.	
Brand Name:		
Model Number/Designation:	GST36B05	
Model differences:	N/A	
Class A External Power supply	☒ Yes ☐ No	
External Power Supply Product Class ID	☒ B	Direct Operation, AC-DC, Basic-Voltage
	☐ C	Direct Operation, AC-DC, Low-Voltage (except those with nameplate output voltage less than 3 volts and nameplate output current greater than or equal to 1,000 milliamps that charge the battery of a product that is fully or primarily motor operated)
	☐ D	Direct Operation, AC-AC, Basic-Voltage
	☐ E	Direct Operation, AC-AC, Low-Voltage
	☐ H	Direct Operation, High-Power
	☐ N	Indirect Operation

Nameplate Rating:	Input:	100-240VAC, 50/60HZ, 0.8A
	Output:	5Vdc, 4.3A

Each sample was tested at:	☐ 115V, 60Hz	☐ 230V, 50Hz	☒ Both
UUT Output Cord Length (± 1 cm):	100		
UUT is a Replacement EPS:	☐ Yes	☒ No	☐ N/A
Presence of Input Power Switch (Y/N):	☐ Yes	☒ No	
Input Power Switch (ON/OFF):	☐ ON	☐ OFF	☒ N/A
End Product Powered by the UUT:	N/A		

Notes/Comments:
☒ For Mexico EE - Las pruebas realizadas en 115/230 Vaca son consideradas representativas al 127/220 Vac. (Tests performed on 115/230 Vac were considered representative to 127/220 Vac.)

TECHNICIAN'S REFERENCE PAGE

DEFINITIONS

“UUT”: UUT is any acronym for “Unit Under Test”

“Low Voltage External Power Supply”: An external power supply (EPS) with a nameplate output voltage of less than 6 volts and a nameplate output current greater than or equal to 550 milliamperes.

“Active Mode”: The condition in which the input of a power supply is connected to line voltage ac and the output is connected to an ac or a dc load drawing a fraction of the power supply's nameplate power output greater than zero.

“Active Mode Efficiency”: The ratio, expressed as a percentage, of the total active output power (ac or dc) produced by a power supply to the active input power (ac) required to produce the total active output power.

“No-Load Mode”: The condition in which the input of a power supply is connected to an ac source consistent with the power supply's nameplate ac voltage, but the output is not connected to a product or any other load.

“Power Factor (True)”: The true power factor is the ratio of the active or real power (P) consumed in watts to the apparent power (S), drawn in volt-amperes (VA).

$$PF = P/S$$

“Basic-Voltage External Power Supply”: An external power supply is not a low-voltage external power supply.

“Direct Operation External Power Supply”: An external power supply can operate a consumer product that is not a battery charger without the assistance of a battery.

“Indirect Operation External Power Supply”: An external power supply cannot operate a consumer product that is not a battery charger without the assistance of a battery.

POWER MEASUREMENTS

All power figures should be in watts and rounded to the second decimal place. For loads greater than or equal to 10 W, three significant figures shall be reported.

Where the measured power is not stable, average power readings over a user-selected period are used in this case. The test instrument shall record the true average power over a user selected period, the period selected shall not be less than 5 minutes. If the power varies over a cycle, the period selected to average power shall be one or more complete cycles.

INPUT METER CONSIDERATIONS

The power measurement instrument shall have a resolution of:

- 0.01 W or better for power measurements of 10 W or less;
- 0.1 W or better for power measurements of greater than 10 W up to 100 W; and
- 1 W or better for power measurements of greater than 100 W.

The following attributes in addition to those above are suggested for the input power meter:

- Frequency response of at least 3 kHz.

Power measurement instrument having the ability to average power accurately over any user-selected time interval (this is usually done with an internal math calculation dividing accumulated energy by time within the meter, which is the most accurate approach).

TECHNICIAN'S REFERENCE PAGE (Cont'd)

INSTRUCTIONS – TEST PREPARATION AND LOADING

“Built-in switch”: if a built-in switch in the UUT control power flow to the ac input, it shall be ON position for measurement.

“Output Cord”: the UUT must be tested with the output cord supplied by the manufacturer.

Metering equipment shall be connected to the output of the power supply by:

Cutting the cord immediately adjacent to the output connector

Attaching leads and measuring the efficiency from the output connector itself

Where the UUT is directly connected to the end product that it is powering, the cord immediately adjacent to the powered product shall be cut and output measurement probes shall be connected at that point.

“UUT with more than 2 output wires”: in similar cases, the tests shall be conducted on two output wires that supply power to the product. The other output wires (i.e.: used for battery monitoring) shall be left disconnected.

“UUT with switchable output”: in similar cases, the UUT shall be tested for each output voltage, one at a time.

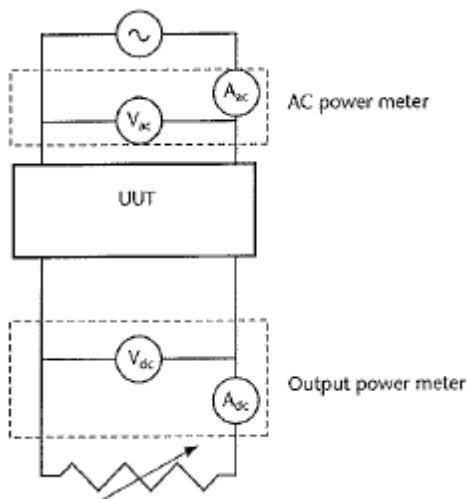
“Loading”: A set of variable Resistive of Electronics Loads shall be used to load the power supply to produce the four active-mode load conditions specified in Table 1 (Load Conditions 1 to 4). While this load may differ from the electronic loads that EPS are designed to power, they provide standardized and repeatable references for testing and product comparison.

When an Electronic Load is used for the output loading, the desired output current should be adjusted in constant current (CC) mode rather than adjusting the required output power in constant power (CP) mode.

When a Resistive Load is used, it needs to be measured precisely with an ohmmeter, a variable resistor may be adjusted to the point where an ammeter confirms that the desired percentage of nameplate output current is flowing through the load.

Figure A1 shows an external power supply test set-up using a variable resistance as the load.

Figure A1 – Generic test set-up using a variable resistive load



Tested by: Frank Lin	Tested by: Frank Lin	Test Date: 2015-10-26
signature	print	
Sample # : 0924002-1 , 0924003-2 , 0924002-3	Instrument Code / Range:	

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:

TESTING SEQUENCE:

The UUT shall be tested at each load condition specified in Table 1, testing consecutively from Load Condition 1 (100% Load) to Load Condition 5(No-Load).

The UUT shall be operated at 100% of nameplate current output (Table 1: Load Conditions 1) for at least 30 minutes immediately prior to conducting efficiency measurements.

For Agencies other than NRCan, after the warm-up period, the technician shall monitor AC input power for a period of 5 minutes to assess the stability of the UUT. If the power level does not drift by more than 5% from the maximum value observed, the UUT can be considered stable and the indicated measurements can be recorded at the end of the 5 minute period.

For NRCan, after the warm-up period, the unit shall continue to run in the load condition and the power shall be recorded after using the Accumulated Energy approach outlined in CAN/CSA 62301 clause 5.3.2b for at least 5 minutes.

NOTE: To ensure consistent units, it is recommended that watt-hours and hours be used above, to give watts.

For Agencies other than NRCan, subsequent Load Conditions 2 - 5 (See Table 1) can then be measured under the same 5 minute stability guidelines. Please take note that only for compliance with requirements in NRCan programs and CSA/CAN381.1-08, the UUT shall operate under each of the subsequent active/no-load mode conditions (Table 1: Load Conditions 2 to 5) for a minimum warm-up period of not less than 30 minutes.

While the unit operates under each of the subsequent Load Conditions from 2 to 5 (See Table 1) for a period of time not less than required warm-up period, the technician shall record all the indicated measurements two (2) times for each Load Condition, as indicated below:

1st Measurement (required for all Agencies except NRCan): the technician shall monitor ac input power for a period of 5 minutes to assess the stability of the UUT (See of Table 1, 2 and 3 for details). If the power level does not drift by more than 5% from the maximum value observed, the UUT shall be considered stable and the measurements can be recorded at the end of the 5 minute period. When AC input power is not stable over the 5 minute period, the technician shall follow the guidelines established by IEC62301, Clause 5.3.2 (a) for measuring average power or Clause 5.3.2 (b) for measuring accumulated energy over time for both AC input and DC output⁽¹⁾.

2nd Measurement (required for NRCan only): After the mandatory 30 minutes warm-up period for each of the subsequent Load Conditions (See of Table 1, 2 and 3 for details) the unit shall continue to run in the load condition and the power shall be recorded after using the Accumulated Energy approach outlined in CAN/CSA 62301 clause 5.3.2b for at least 5 minutes.

⁽¹⁾ = IEC62301 and CAN/CSA62301 standards are intended to measure input power, however the methods specified in Clauses 5.3.2 (a) and 5.3.2 (b), may be used to measure Output power for the purposes of this testing.

The sequence mentioned above at items 1 and 2 shall be repeated for each Load Conditions from 2 to 5 in Table 1.

For Australia/New Zealand requirements (AuNZ), if a power supply has only a 240V, 50Hz input, conduct the testing at 240 V, 50Hz input and record the data in the 230V tables for ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST. Indicate on the data tables that testing was conducted at 240V, 50 Hz input.

Tested by: <u>Frank Lin</u> signature	Tested by: <u>Frank Lin</u> print	Test date: <u>2015-10-26</u>
Sample # : <u>0924002-1 , 0924003-2 , 0924002-3</u>	Instrument Code / Range: _____	

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

TESTING SEQUENCE (Cont'd)

The above testing sequence shall be repeated on three (3) units in total of the same UUT.

Table 1 – Load Conditions and testing sequence

Load Conditions for UUT	Percentage of Nameplate Output Current	Warm-up period by Load Conditions [minutes]	Assessment period after warm-up [minutes]	Number of measurement(s) by Load Conditions
1	100% ± 2% ⁽²⁾	30	5 0 (NRCAN)	1 other Agencies 5 min Accumulated Energy
2	75% ± 2%	0 (for other agencies)	5	1 for other Agencies
		30 (for NRCAN)	0	5 min Accumulated Energy
3	50% ± 2%	0 (for other agencies)	5	1 for other Agencies
		30 (for NRCAN)	0	5 min Accumulated Energy
4	25% ± 2%	0 (for other agencies)	5	1 for other Agencies
		30 (for NRCAN)	0	5 min Accumulated Energy
5	0%	0 (for other agencies)	5	1 for other Agencies
		30 (for NRCAN)	0	5 min Accumulated Energy

Note(s):

- ⁽²⁾The 2% allowance is of nameplate output current, not of the calculated current value.
- For example, a UUT at Load Condition 3 may be tested in a range from 48% (min) to 52% (max) of rated output current.
- It is mandatory for CoC. The UUT shall be considered 10% ± 2% of nameplate output current after load condition 4, warm up period is 0 minute and 5 minutes is for assessment period, and then continue condition 5.

Comments:

- If test has not been performed in accordance with requirements in NRCAN: Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II; technicians shall fill all cells related to NRCAN results with “-” or leave them “blank”.
- If test has been performed in accordance with requirements in NRCAN program only, technician shall fill all cells related to results for all other Agencies other than NRCAN with “-” or leave them “blank”.
- If instantaneous power measurement is acceptable, technician record the instantaneous power measurement under the column “Avg. Power (W)” and then shall fill cells of columns “Wh” and “Wh Interval” with “-” or leave them “blank”.

Tested by: Frank Lin Tested by: Frank Lin Test date: 2015-10-26
signature print
Sample #: 0924002-1 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:(Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23.6 Relative Humidity (%): 64.9 Airspeed, room (m/s) : <0.2
Sample No.: 1
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 4.3

	External Power Supply Input Electric Data										Power Supply [DC] Output			
Load #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	114.73	60.00	0.423	0.52	0.18	2.1071	25.2852	5	30 (All)	0.05	4.98	4.29	1.7861	21.4332
2 (75%)	114.75	60.00	0.332	0.50	0.16	1.5803	18.9636	5	0 (others)	0.05	5.01	3.23	1.3513	16.2156
	114.75	60.00	0.332	0.50	0.16	1.5803	18.9636	5	30 (NRCan)	0.05	5.01	3.23	1.3513	16.2156
3 (50%)	114.77	60.00	0.233	0.47	0.14	1.0448	12.5376	5	0 (others)	0.10	5.04	2.15	0.9037	10.8444
	114.77	60.00	0.233	0.47	0.14	1.0448	12.5376	5	30 (NRCan)	0.10	5.04	2.15	0.9037	10.8444
4 (25%)	114.79	60.00	0.127	0.43	0.13	0.5240	6.2880	5	0 (others)	0.11	5.07	1.07	0.4508	5.4096
	114.79	60.00	0.127	0.43	0.13	0.5240	6.2880	5	30 (NRCan)	0.11	5.07	1.07	0.4508	5.4096
5 (0%)	114.81	60.00	0.013	0.02	0.13	0.0019	0.0228	5	0 (others)	44.73				
	114.81	60.00	0.013	0.02	0.13	0.0019	0.0228	5	30 (NRCan)	44.73				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)					NRCan - Average results Efficiency of Power Supply (after 30 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4	100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
84.766	85.50908	86.49502	86.03053	85.70010743	84.76579	85.50908	86.49502	86.0305344	85.70010743

Other than NRCan - Power Consumed by UUT (W)					NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load	100%	75%	50%	25%	No Load
3.852	2.748	1.6932	0.8784	0.0228	3.852	2.748	1.6932	0.8784	0.0228

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test date: 2015-10-26
signature print
Sample # : 0924003-2 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23.6 Relative Humidity (%): 64.9 Airspeed, room (m/s) : <0.2
Sample No.: 2
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 4.3

	External Power Supply Input Electric Data										Power Supply [DC] Output			
Load #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	114.73	60.00	0.420	0.52	0.17	2.1075	25.2900	5	30 (All)	0.05	4.99	4.29	1.7884	21.4608
2 (75%)	114.75	60.00	0.330	0.50	0.15	1.5792	18.9504	5	0 (others)	0.05	5.02	3.23	1.3524	16.2288
	114.75	60.00	0.330	0.50	0.15	1.5792	18.9504	5	30 (NRCan)	0.05	5.02	3.23	1.3524	16.2288
3 (50%)	114.77	60.00	0.232	0.47	0.13	1.0442	12.5304	5	0 (others)	0.14	5.04	2.15	0.9045	10.8540
	114.77	60.00	0.232	0.47	0.13	1.0442	12.5304	5	30 (NRCan)	0.14	5.04	2.15	0.9045	10.8540
4 (25%)	114.79	60.00	0.126	0.43	0.13	0.5227	6.2724	5	0 (others)	0.21	5.07	1.07	0.4515	5.4180
	114.79	60.00	0.126	0.43	0.13	0.5227	6.2724	5	30 (NRCan)	0.21	5.07	1.07	0.4515	5.4180
5 (0%)	114.81	60.00	0.013	0.02	0.13	0.0022	0.0264	5	0 (others)	38.10				
	114.81	60.00	0.013	0.02	0.13	0.0022	0.0264	5	30 (NRCan)	38.10				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)					NRCan - Average results Efficiency of Power Supply (after 30 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4	100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
84.859	85.6383	86.62134	86.37842	85.874223	84.85884	85.6383	86.62134	86.3784197	85.874223

Other than NRCan - Power Consumed by UUT (W)					NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load	100%	75%	50%	25%	No Load
3.8292	2.7216	1.6764	0.8544	0.0264	3.8292	2.7216	1.6764	0.8544	0.0264

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-10-26
signature print
Sample #: 0924002-3 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23.6 Relative Humidity (%): 64.9 Airspeed, room (m/s) : <0.2
Sample No.: 3
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 4.3

Load #	External Power Supply Input Electric Data							Power Supply [DC] Output						
	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	114.73	60.00	0.420	0.53	0.16	2.1190	25.4280	5	30 (All)	0.04	5.01	4.29	1.7945	21.5340
2 (75%)	114.76	60.00	0.329	0.50	0.14	1.5889	19.0668	5	0 (others)	0.05	5.04	3.23	1.3567	16.2804
	114.76	60.00	0.329	0.50	0.14	1.5889	19.0668	5	30 (NRCan)	0.05	5.04	3.23	1.3567	16.2804
3 (50%)	114.78	60.00	0.231	0.47	0.13	1.0500	12.6000	5	0 (others)	0.14	5.07	2.15	0.9069	10.8828
	114.78	60.00	0.231	0.47	0.13	1.0500	12.6000	5	30 (NRCan)	0.14	5.07	2.15	0.9069	10.8828
4 (25%)	114.79	60.00	0.126	0.43	0.13	0.5241	6.2892	5	0 (others)	0.16	5.09	1.06	0.4520	5.4240
	114.79	60.00	0.126	0.43	0.13	0.5241	6.2892	5	30 (NRCan)	0.16	5.09	1.06	0.4520	5.4240
5 (0%)	114.81	60.00	0.013	0.01	0.12	0.0017	0.0204	5	0 (others)	48.31				
	114.81	60.00	0.013	0.01	0.12	0.0017	0.0204	5	30 (NRCan)	48.31				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)					NRCan - Average results Efficiency of Power Supply (after 30 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4	100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
84.686	85.38612	86.37143	86.24308	85.67170021	84.68617	85.38612	86.37143	86.2430834	85.67170021

Other than NRCan - Power Consumed by UUT (W)					NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load	100%	75%	50%	25%	No Load
3.894	2.7864	1.7172	0.8652	0.0204	3.894	2.7864	1.7172	0.8652	0.0204

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-10-26
signature print
Sample #: 0924002-1 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23.6 Relative Humidity (%): 64.9 Airspeed, room (m/s) : <0.2
Sample No.: 1
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 4.3

Load #	External Power Supply Input Electric Data							Power Supply [DC] Output						
	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	229.62	50.00	0.274	0.40	0.22	2.0986	25.1832	5	30	0.08	4.99	4.29	1.7860	21.4320
2 (75%)	229.63	50.00	0.210	0.39	0.20	1.5698	18.8376	5	0	0.11	5.02	3.23	1.3514	16.2168
3 (50%)	229.63	50.00	0.146	0.38	0.18	1.0541	12.6492	5	0	0.08	5.04	2.15	0.9039	10.8468
4 (25%)	229.63	50.00	0.080	0.35	0.15	0.5266	6.3192	5	0	0.10	5.07	1.07	0.4508	5.4096
5 (0%)	229.63	50.00	0.019	0.01	0.15	0.0025	0.0300	5	0	65.79				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
85.104	86.0874	85.75088	85.60577	85.63710134

Other than NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load
3.7512	2.6208	1.8024	0.9096	0.0300

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-10-26
signature print
Sample #: 0924003-2 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23.6 Relative Humidity (%): 64.9 Airspeed, room (m/s) : <0.2
Sample No.: 2
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 4.3

External Power Supply Input Electric Data											Power Supply [DC] Output			
Load #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	229.61	50.00	0.269	0.41	0.21	2.1019	25.2228	5	30	0.08	4.99	4.29	1.7889	21.4668
2 (75%)	229.62	50.00	0.206	0.40	0.19	1.5714	18.8568	5	0	0.11	5.02	3.23	1.3525	16.2300
3 (50%)	229.62	50.00	0.144	0.38	0.16	1.0491	12.5892	5	0	0.16	5.05	2.15	0.9045	10.8540
4 (25%)	229.64	50.00	0.080	0.34	0.15	0.5299	6.3588	5	0	0.08	5.07	1.07	0.4514	5.4168
5 (0%)	229.63	50.00	0.019	0.01	0.15	0.0027	0.0324	5	0	30.43				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
85.109	86.06975	86.21676	85.18588	85.64527481

Other than NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load
3.756	2.6268	1.7352	0.942	0.0324

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-10-26
signature _____ print _____
Sample #: 0924002-3 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23.6 Relative Humidity (%): 64.9 Airspeed, room (m/s) : <0.2
Sample No.: 3
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 4.3

Load #	External Power Supply Input Electric Data							Power Supply [DC] Output						
	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	229.61	50.00	0.263	0.42	0.20	2.1132	25.3584	5	30	0.04	5.01	4.29	1.7945	21.5340
2 (75%)	229.62	50.00	0.201	0.41	0.18	1.5793	18.9516	5	0	0.16	5.04	3.23	1.3566	16.2792
3 (50%)	229.63	50.00	0.142	0.39	0.15	1.0592	12.7104	5	0	0.08	5.06	2.15	0.9070	10.8840
4 (25%)	229.63	50.00	0.079	0.35	0.15	0.5293	6.3516	5	0	0.09	5.09	1.06	0.4519	5.4228
5 (0%)	229.63	50.00	0.019	0.01	0.14	0.0025	0.0300	5	0	67.79				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
84.919	85.89882	85.63066	85.37691	85.45625008

Other than NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load
3.8244	2.6724	1.8264	0.9288	0.0300

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test date: 2015-10-26
signature print
Sample # : 0924002-1 , 0924003-2 , 0924002-3 Instrument Code / Range: _____

ACTIVEMODE POWER CONSUMPTION TEST at 10% LOADING:

RESULTS:

Ambient Temperature (°C): 23.6 Relative Humidity (%): 64.9 Airspeed, room (m/s) : <0.2
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 4.3

Sample #	External Power Supply Input Electric Data										Power Supply [AG] [DC] Output			
	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1	114.81	60.00	0.058	0.37	0.13	0.2079	2.4948	5	0	0.16	5.09	0.42	0.1778	2.1336
2	114.80	60.00	0.059	0.37	0.13	0.2090	2.5080	5	0	0.28	5.09	0.42	0.1786	2.1432
3	114.81	60.00	0.059	0.37	0.13	0.2090	2.5080	5	0	0.12	5.11	0.42	0.1781	2.1372

Sample #	Efficiency Value (%)
1	85.522
2	85.455
3	85.215

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test date: 2015-10-26
signature print
Sample # : 0924002-1 , 0924003-2 , 0924002-3 Instrument Code / Range: _____

ACTIVEMODE POWER CONSUMPTION TEST at 10% LOADING (Mandatory for CoC, Optional for other than CoC):

RESULTS:

Ambient Temperature (°C): 23.6 Relative Humidity (%): 64.9 Airspeed, room (m/s) : <0.2
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 4.3

	External Power Supply Input Electric Data										Power Supply [AC] [DC] Output			
Sample #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1	229.63	50.00	0.040	0.28	0.15	0.2139	2.5668	5	0	0.16	5.09	0.42	0.1776	2.1312
2	229.63	50.00	0.041	0.27	0.15	0.2158	2.5896	5	0	0.12	5.09	0.42	0.1783	2.1396
3	229.63	50.00	0.042	0.27	0.15	0.2157	2.5884	5	0	0.31	5.11	0.42	0.1778	2.1336

Sample #	Efficiency Value (%)
1	83.029
2	82.623
3	82.429

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

WORKSHEETS

The measured is the following:						
Minimum Average Efficiency in ActiveMode	Input Voltage (V ac):	☒ 115V, 60Hz ☐ NRCan ☐ Other Then NRCan		☒ 230V, 50Hz	☒ 115/230V, 50/60Hz	☐ Other: V, Hz
	Sample No.:	--	0924002-3	0924002-3	0924002-3	/
	Efficiency (%):	--	85.6	85.4	85.4	/
Minimum 10% Load Average Efficiency in Active Mode	Sample No.:	--	0924002-3	0924002-3	0924002-3	/
	Efficiency (%):	--	85.2	82.4	82.4	/
Maximum Power In No-Load Condition	Sample No.:	--	0924003-2	0924003-2	0924003-2	/
	Power (W) :	--	0.026	0.032	0.032	/
Note: ☐ There are two measurements at 115Vac, 60Hz, due to the test methods is different between NRCan and the other regulations. ☒ For NRCan testing, according to guidance form the letter to CB for EPS testing 4-16-12, the test procedure is following "TestMethod for Calculating the Energy Efficiency of Single-Voltage External Ac-Dc and Ac-Ac Power Supplies," August 11,2004, in APPENDIX Z to SUBPART B of PART 430 instead of C381.1-08. The results are more than .8 (>) above theminimum efficiency standard.						

International Efficiency Marking Protocol (IEMP) for External Power Supplies:

Base on Table 2, this EPS is complied with the requirements for level: VI at ☒115V ac; ☒230V ac;
 The calculated Minimum Average Efficiency in Active Mode is:0.835 (83.5%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.100Watt.
☐The true power factor was 0.9 or greater at 100% of rated load when tested at 115V, 60Hz. This requirement applies only to Level V power supplies with input power greater than or equal to 100W at 115V, 60Hz.

Canada NRCan Energy Efficiency Requirements: (at 115V ac, 60Hz)

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is:0.776(77.6%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.5 Watt.
 This ☒complies ☐does not comply with requirements in:
 Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II

US DoE and CEC Requirements for Class A external power supply: (at 115V ac, 60Hz)

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is:0.776 (77.6%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.5 Watt.
 This ☒complies ☐ does not comply with requirements in:
☒ **US DoE:** Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430
☒ **US CEC:** Appliance Efficiency Regulations (California Code of Regulations, Title 20, Sections 1601 through

1608), dated May, 2014 (CEC-400-2014-009-CMF)

WORKSHEETS (CONT'D)

US DoE Requirements for Direct operation external power supply: (at 115V ac, 60Hz)

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is:0.835 (83.5%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.100Watt.

This ☒ complies ☐ does not comply with requirements in:

Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430

Australian and New Zealand: (at 230V ac or 240V ac, 50Hz)

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is:0.791 (79.1%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.300Watt.

This ☒ complies ☐ does not comply with performance mark ☒III; ☒IV; ☒V requirements in:

Australian Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014 and NewZealand Energy Efficiency (Energy Using Products) Regulations 2002

Note:

For **Australian**, according to Clause 8(1)(b) in Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014, if a product exceeds the energy performance requirements for Mark V as mentioned in Appendix A of AS/NZS 4665.1:2005 and meets the performance requirements for Mark VI mentioned in the IEMP then the product may be labelled in accordance with the requirements for:

(i) Mark V mentioned in Appendix A of AS/NZS 4665.1:2005 and sections 4.2 and 5 of AS/NZS 4665.2:2005 (Energy Performance Mark); or (ii) Mark VI mentioned in the IEMP.

European Union (EU) Code of Conduct: (at 230V ac, 50Hz)

Base on Table 3, 4, 5, 6, and 7, the calculated Minimum Average Efficiency in Active Mode is:Tier1 : 0.818(81.8%), Tier2 : 0.841(84.1%), at 10% Load is:Tier1 : 0.721(72.1%), Tier2 : 0.747(74.7%),and MaximumEnergyConsumption in No-Load Mode is not greater than Tier1 : 0.150, Tier2 : 0.075Watt.

This ☒ complies ☐ does not comply with ☒ Tier 1 and ☒ Tier 2 requirements for **Code of Conduct on Energy Efficiency of External Power Supplies, Version 5**.

MEXICO CONUEE and PROFECO: Energy Consumption Information

1) Energy consumption by unit of time under normal operating conditions of the equipment or appliance ⁽¹⁾:25.428 Wh. If applicable⁽²⁾:

2) Consumption of energy in idle mode in unit of time of the equipment or appliance ⁽³⁾:0.032 Wh.

Notes:

(1) This is the consumption under full charge conditions and for a 1 hour period of time. The consumption must be indicated in the following units: kW-h/year, kW-h /month W-h /day.

(2) In accordance with Article 26, section II, of the Regulation of the Law for the Sustainable Use of Energy, if applicable, it must indicate the consumption of energy in idle mode by unit of time. If not applicable, write "not applicable."

(3) This is the passive electric energy consumption, when the appliance or equipment is connected to the electrical power circuit, even when the equipment is off, and not performing its main function. The consumption must be indicated in the following units: kW-h/year, kW-h /month W-h /day.

(4). The energy consumption for a hour (Wh) is calculated by the following equation:

The Maximum Avg. Power (Watts) at 100% load x1 hour (h).

Table 2: International Efficiency Marking Protocol for External Power Supplies;

Mark	Performance Requirements				
	Nameplate Output Power (P_{no}) ²	No-Load Mode Power ³	Nameplate Output Power (P_{no})	Average Efficiency in Active Mode ⁴	Power Factor
I	Used if none of the other criteria are met.				
II	0 to ≤ 10 W	≤ 0.75	0 to < 1 W	≥ 0.39 * P_{no}	Not Applicable
	> 10 to 250 W	≤ 1.0	1 to < 49 W	≥ 0.107 * ln(P_{no}) + 0.39	
			> 49 W	≥ 0.82	
III	0 to < 10 W	≤ 0.5	0 to 1 W	≥ 0.49 * P_{no}	Not Applicable
	10 to 250 W	≤ 0.75	> 1 to 49 W	≥ 0.09 * ln(P_{no}) + 0.49	
			> 49 to 250 W	≥ 0.84	
IV	0 to 250 W	≤ 0.5	0 to < 1 W	≥ 0.5 * P_{no}	Not Applicable
			1 to 51 W	≥ 0.09 * ln(P_{no}) + 0.5	
			> 51 to 250 W	≥ 0.85	
V	0 to < 50 W	AC-DC: ≤ 0.3 AC-AC: ≤ 0.5	0 to ≤ 1 W	Basic Voltage: ≥ 0.480 * P_{no} + 0.140 Low Voltage ⁵ : ≥ 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.
	≥ 50 to ≤ 250 W	≤ 0.5	> 1 to ≤ 49 W	Basic Voltage: ≥ 0.0626 * ln(P_{no}) + 0.622 Low Voltage: ≥ 0.0750 * ln(P_{no}) + 0.561	
			> 49 to 250 W	Basic Voltage: ≥ 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.				

Table 3: Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum Four Point Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no} + 0.146$	$\geq 0.500 * P_{no} + 0.169$
> 1 to ≤ 49 Watts	$\geq 0.0626 * \ln(P_{no}) + 0.646$	$\geq 0.071 * \ln(P_{no}) - 0.00115 * P_{no} + 0.670$
> 49 to ≤ 250 Watts	≥ 0.890	≥ 0.890
Note: All efficiency values shall be rounded to the hundredths place.		

Table 4: Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum Four Point Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no} + 0.086$	$\geq 0.517 * P_{no} + 0.091$
> 1 to ≤ 49 Watts	$\geq 0.0755 * \ln(P_{no}) + 0.586$	$\geq 0.0834 * \ln(P_{no}) - 0.0011 * P_{no} + 0.609$
> 49 to ≤ 250 Watts	≥ 0.880	≥ 0.880
Note: All efficiency values shall be rounded to the hundredths place.		

Table 5: Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum 10% Load Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no} + 0.046$	$\geq 0.5 * P_{no} + 0.060$
> 1 to ≤ 49 Watts	$\geq 0.0626 * \ln(P_{no}) + 0.546$	$\geq 0.071 * \ln(P_{no}) - 0.00115 * P_{no} + 0.570$
> 49 to ≤ 250 Watts	≥ 0.790	≥ 0.790
Note: All efficiency values shall be rounded to the hundredths place.		

Table 6: Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum 10% Load Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no}$	$\geq 0.517 * P_{no}$
> 1 to ≤ 49 Watts	$\geq 0.072 * \ln(P_{no}) + 0.500$	$\geq 0.0834 * \ln(P_{no}) - 0.00127 * P_{no} + 0.518$
> 49 to ≤ 250 Watts	≥ 0.780	≥ 0.780
Note: All efficiency values shall be rounded to the hundredths place.		

Table 7: Power Consumption Criteria for No-Load

Nameplate Output Power (P_{no})	Maximum Power in No-Load	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
≥ 0.3 to < 49 Watts	≤ 0.150 watts	≤ 0.075 watts
≥ 49 to < 250 Watts	≤ 0.250 watts	≤ 0.150 watts
Mobile handheld battery driven and < 8 W	≤ 0.075 watts	≤ 0.075 watts

===== END OF DATASHEET PACKAGE. =====



ENERGY EFFICIENCY CERTIFICATION (EEC): Test Report - Cover Page

Customer Name: Mean Well Enterprises Co., Ltd.

Address: No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 24891 Taiwan

Brand Name(s):



Model Number(s): GST36B09, GST36E09, GST36U09

Product Category: External Power Supply

Representative (tested) Model: GST36B09

Model Differences: All models are identical except for model designation

The sample(s) tested is(are) compliant with the following applied standards/regulations:

NRCAN: Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II

US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609

US DoE: Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430

EU Directive for Energy-related Products ErP 2009/125/EC and Implementing Measure (IM) no. EC278/2009 for External Power Supply

Australian (Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014) and New Zealand (Minimum energy performance standards)

EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5

Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances

Test Location Name: MEAN WELL ENTERPRISES CO., LTD.

Test Location Address: 28 WUQUAN 3RD RD, WUGU DISTRICT, NEW TAIPEI, 24891 TAIWAN

Testing Performed Under: ☐ UL Lab ☐ Private Label
☒ CTDP/SMTL ☐ WMTL ☐ EPA 3rd Party

UL Project No.: 4786997669 BA2, 4788995393-b

Project Handler: Hans Chen

Reviewed by: Evy Chang / Jasmin Wang

Issued: 2015-11-30
(yyyy-mm-dd)

Revised: 2019-08-02
(yyyy-mm-dd)

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ATTACHMENT(S)

- Results Summary of International Efficiency Marking Protocol.
- Model(s) GST36B09, GST36E09, GST36U09 are Direct Operation, AC-DC, Basic-Voltage type EPS.

Test	Result	Compliant, Y/N
The roman numeral mark of International efficiency marking protocol, if applicable	VI	Yes

Label information:



00-VS-F0417, Version 6.0 The information and documentation involving UL Mark services are provided on behalf of UL Verification Services Inc. or any authorized licensee of UL Verification Services Inc.. The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products.



Annex A1

Regulatory Body	Test Method, Regulation or Program Evaluated to	Test Limit per Regulation or Program Requirement		Measurements		Other
		Average Efficiency In Active Mode	No-Load Mode Power	Average Efficiency In Active Mode	No-Load Mode Power	
NRCan	10 CFR Parts 429 and 430	≥ 86.7 %	≤ 0.1 W	88.15 %	0.0265 W	Complied
DoE	10 CFR Parts 429 and 430	≥ 86.7 %	≤ 0.1 W	88.15 %	0.0265 W	Level VI
CEC	Appliance Efficiency Regulations, Sections 1601 through 1609	≥ 86.7 %	≤ 0.1 W	88.15 %	0.0265 W	Complied
ErP	Annex I(b) Of 2009/125/EC and Commission Regulation (EC) No 278/2009	≥ 83.2 %	≤ 0.3 W	88.17 %	0.0367 W	Complied
Australian (GEMS) and New Zealand	AS/NZS4665.1-2005+A1:2009; AS/NZS4665.2-2005+A1:2009	≥ 83.1 %	≤ 0.3 W	88.17 %	0.0323 W	'High efficiency' performance mark V; Mark VI mentioned in the IEMP
CoC	Energy Efficiency of External Power Supplies Version 5	≥ 87.4 % ≥ 77.4 % @10% load	≤ 0.075 W	88.17 % 84.95 %	0.0367 W	Complied
Quebec	10 CFR Parts 429 and 430	≥ 86.7 %	≤ 0.1 W	88.15 %	0.0265 W	Complied

Additional Information:

See Energy Efficiency Laboratory Data Package of Project No: 4788995393-b for further details and test results.

N/A = Not Applicable

Project History:

For Project 4788995393-b:

- 1). Update regulations from NRCan: Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II to NRCan: Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II.
- 2). Update regulations from US CEC: Appliance Efficiency Regulations (California Code of Regulations, Title 20, Sections 1601 through 1608) dated July 2015 to US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609.
- 3). Update regulations from Australian (GEMS) and New Zealand : AS/NZS4665.1-2005+A1:2009 ; AS/NZS4665.2-2005+A1:2009 to Australian (Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014) and New Zealand (Minimum energy performance standards).

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4) Adding regulations Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances.

5). Update customer information from Mean Well Enterprises Co., Ltd., address No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 248 Taiwan to Mean Well Enterprises Co., Ltd., address No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 24891 Taiwan.

00-VS-F0417, Version 6.0 The information and documentation involving UL Mark services are provided on behalf of UL Verification Services Inc. or any authorized licensee of UL Verification Services Inc.. The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products.

DATA PACKAGE INFORMATION SHEET

Applicant Information	Name:		Mean Well Enterprises Co., Ltd.	
	Address:		No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 24891 Taiwan	
Product Information	Standard(s) or Regulation(s)	☒ US DoE: Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430		
		☒ US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609		
		☐ NRCan: Amendment 13 to the Energy Efficiency Regulations for External Power Supplies, in the Canada Gazette, Part II		
		☒ NRCan: Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II		
		☒ Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances		
		☒ Australian (Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014) and New Zealand (Minimum energy performance standards)		
		☒ EU Directive for Energy-related Products ErP 2009/125/EC and Implementing Measure (IM) no. EC278/2009 for External Power Supply		
		☒ EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5		
		☐ Mexico: NORMA Oficial Mexicana NOM-029-ENER-2017, Eficiencia energética de fuentes de alimentación externa. Límites, métodos de prueba, marcado y etiquetado.		
		☐ Other:		
	Test method(s)	☒ 10 CFR part 430, subpart B, Appendix Z "Uniform Test Method for Measuring the Energy Consumption of External Power Supplies"		
		☒ CAN/CSA-C381.1-08 Test method for calculating the energy efficiency of single-voltage external ac-dc and ac-ac power supplies		
		☒ CAN/CSA-C381.1-17 Test method for calculating the energy efficiency of single-voltage external ac-dc and ac-ac power supplies		
		☒ EN50563-2011/A1:2013, External a.c. - d.c. and a.c. - a.c. power supplies – Determination of no-load power and average efficiency of active modes		
		☒ EN50564-2011, Electrical and electronic household and office equipment - Measurement of low power consumption		
☒ "Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies" dated August 11, 2004				
☒ AS/NZS4665.1-2005+A1:2009; AS/NZS4665.2-2005+A1:2009				
☐ Other:				
Protocol		☒ International Efficiency Marking Protocol for External Power Supplies, Version 3.0		
CCNs:		ENVP		
Product Name/Type:		External Power Supply ☒ AC-DC ☐ AC-AC		
Model Number(s):		GST36B09, GST36E09, GST36U09		
Test Location Information	DAP and UL:		☒ CTD ☐ TCP ☐ TPTDP ☐ WTD ☐ UL	
	Test Location Name:		MEAN WELL ENTERPRISES CO., LTD.	
	Test Location Address:		28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 24891 TAIWAN	
	Tests Conducted By**:		Print Frank Lin	
	**When all tests are conducted by one person, the printed name and signature can be inserted here instead of on each page containing data.			
	Authorized Signatory or TCP		Print Frank Lin	
	Reviewer:		Date 2019-07-15	
	UL WTD Witness:		☐ UL Staff conducting or witnessing testing (WTD only) ☐ UL Staff supervising UL Staff in training	

		Print --
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Special Instructions:

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

Standard	Ambient Temperature °C	Relative Humidity RH %	Supply Voltage Tolerance%	Total Harmonic Distortion THD %	Airspeed, room m/s	Supply Frequency Tolerance %
<u>the test method other than</u> <u>US DoE</u>	23±5	10-80 (For lab references)	±1	<2	≤0.5	±1
US DoE: 10 CFR Parts 429 and 430	20±5					
NOTE: 1. The input voltage source shall be capable of delivering at least 10 times the nameplate input power of the UUT (as is specified in IEEE 1515-2000). 2. Perchapter 4.2 in EN50564:2011, where the product has an ambient light sensor that affects the power consumption, the test shall be carried out with controlled ambient light conditions. Where the illuminance levels are externally defined (in a test procedure or in the instructions for use), these values shall be used. Where no illuminance levels are stated or defined, reference illuminance levels of more than 300 lux and less than 10 lux shall be used.						

Witness Test Data Program (WTDP) Information:

Environment:	
Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025:2005 Clause 5.3.1, 5.3.2, 5.3.3, 5.3.4)	[] Yes [] No [] N/A
Personnel:	
Lab Management shall authorize personnel to operate particular types of equipment used in testing. (ISO/IEC 17025:2005 5.2.5)	[] Yes [] No
Equipment:	
Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025:2005 5.5.1, 5.5.2, 5.5.4, 5.5.5, 5.5.8,)	[] Yes [] No
Calibrations for testing equipment are traceable to SI Units. Refer to 00-OP-C0032 (Calibration Certificate Analysis). (ISO/IEC 17025:2005 5.6.2.2)	[] Yes [] No
Critical Consumables:	
Critical consumables are compliant with test standard requirements. (ISO/IEC 17025:2005 Clause 4.6)	[] Yes [] No [] N/A
Sample Identification:	
Identification of items to be tested has been [] Yes [] No (See Test Sample Identification page and ISO/IEC 17025:2005 Clause 5.8.2)	[] Yes [] No
Additional Requirements:	
Testing at a third party laboratory selected by UL and not part of the Third Party Test Data Program requires a Mutual Nondisclosure (NDA) and Confidentiality Agreement, 00-LE-F0025, or alternate agreement form approved by UL's Legal Department to be stored and included with the Test Package.	[] Yes [] No [] N/A
Summary:	
The test facility was deemed to have the environment and capabilities necessary to perform the tests included in this data package.	[] Yes [] No

☐ The CAS Staff as indicated below, (a competent L1, L2 or L3 in a similar CCN/Standard for a similar test method) was utilized to conduct the witnessing of tests on behalf of the project handler. (Please complete the table below to document the rationale and approval.)

Name of UL Staff conducting WTDP	CCN/Standard to be witnessed	Test(s) to be witnessed	L1, L2 or L3 Competency	Similar CCN/Standard Competency

TEST SAMPLE IDENTIFICATION

The table below is to provide correlation of sample numbers to specific product related information. Refer to this table when a test identifies a test sample by "Sample No." only.

Sample Number	Sample Card Number	Date Received	Manufacturer, Product Identification and Ratings
19AA0715001	19AA	2019-07-15	MEAN WELL External Power Supply Model GST36B09 I/P:100-240VAC, 50/60HZ, 0.8A; O/P:9Vdc, 3.11A
19AA0715002	19AA	2019-07-15	MEAN WELL External Power Supply Model GST36B09 I/P:100-240VAC, 50/60HZ, 0.8A; O/P:9Vdc, 3.11A
19AA0715003	19AA	2019-07-15	MEAN WELL External Power Supply Model GST36B09 I/P:100-240VAC, 50/60HZ, 0.8A; O/P:9Vdc, 3.11A
Sampling Procedure (if used) :		N/A	

TEST INSTRUMENTS REFERENCE LIST

Instr. Code	Instrument I.D.	Instrument Type	Range and/or Function Used ***	Make and Model **	Calibration Date	
					Last	Due
25	ACS002	Frequency Converter	47/50/60/120/ 120/240/450Hz	Chroma / 6530	2019-05-23	2020-05-22
26	Q887652	Anemometer	0.2 m/s	Lutron / AM-4214SD	2019-04-23	2020-04-22
27	15250924	Thermo- Hygograph	10°C ~ +40°C 30%~80%RH	OMEGA / iTHX-SD	2019-05-27	2020-05-26
28	27DB37627	Digital power meter	15V~600V 1mA~20A	YOKOGAWA / WT-210	2019-05-04	2020-05-03
29	6314A003645	DC Electronic Load	1V~60V 40mA~60.12A	Chroma / 63103A	2019-05-15	2020-05-14
30	6314A003646	DC Electronic Load	1V~60V 40mA~60.14A	Chroma / 6314A+, 63103A	2019-05-15	2020-05-14
31	6314A003688	DC Electronic Load	1V~60V 0.4004A~60.19A	Chroma / 6314A+, 63103A	2019-05-15	2020-05-14
32	6314A003689	DC Electronic Load	1V~60V 40.5mA~60.14A	Chroma / 6314A+, 63103A	2019-05-15	2020-05-14

"Chamber setting(s) [] was [] were monitored to ensure that the setting(s) [] was [] were stable throughout the test time frame. Any deviations from the setting(s) are noted below.

Date	Test	Instrument Code	Time period of deviation	Setting(s)

** Information to be recorded when tests are conducted at a non-UL facility.

*** Refer to specific data sheet for individual scale used.

[] UL test equipment information is recorded on Meter Use in UL'S Aurora database.

POWER SUPPLY REFERENCE PAGE (ENGINEERING TO COMPLETE)

Product Name/Type:	External AC/DC Power Supply (EPS)	
Manufacturer:	MEAN WELL ENTERPRISES CO., LTD.	
Brand Name:		
Model Number/Designation:	GST36B09, GST36E09, GST36U09	
Model differences:	N/A	
Class A external power supply	☒ Yes ☐ No	
Adaptive external power supply	☐ Yes ☒ No	
Switch-selectable single voltage external power supply	☐ Yes ☒ No	
External Power Supply Product Class ID	☒ B	Direct Operation, AC-DC, Basic-Voltage
	☐ C	Direct Operation, AC-DC, Low-Voltage (except those with nameplate output voltage less than 3 volts and nameplate output current greater than or equal to 1,000 milliamps that charge the battery of a product that is fully or primarily motor operated)
	☐ D	Direct Operation, AC-AC, Basic-Voltage
	☐ E	Direct Operation, AC-AC, Low-Voltage
	☐ H	Direct Operation, High-Power
	☐ N	Indirect Operation

Nameplate Rating:	Input:	100-240VAC, 50/60HZ, 0.8A
	Output:	9Vdc, 3.11A, 28W Max.

Each sample was tested at:	☒ 115V, 60Hz ☒ 230V, 50Hz ☐ 240V, 50Hz ☐ 127V, 60Hz		
UUT Output Cord Length (± 1 cm):	100		
UUT is a Replacement EPS:	☐ Yes	☒ No	☐ N/A
Presence of Input Power Switch (Y/N):	☐ Yes	☒ No	
Input Power Switch (ON/OFF):	☐ ON	☐ OFF	☒ N/A
End Product Powered by the UUT:	N/A		

Notes/Comments:
☐ For Mexico EE - Las pruebas realizadas en 115/230 V a c e r a n c o n s i d e r a d a s r e p r e s e n t a t i v a s a l 127/220 Vac. (Tests performed on 115/230 Vac were considered representative to 127/220 Vac.)

TECHNICIAN'S REFERENCE PAGE

DEFINITIONS

“UUT”: an acronym for “unit under test,” which in this case refers to the power supply sample being tested.

“Active mode”: A condition in which the input of a power supply is connected to the line voltage ac and the output is connected to an ac or dc load, drawing a fraction of the power supply's nameplate output power.

“Active mode efficiency”: The ratio which is expressed as a percentage, of the total active output power (ac or dc) produced by a power supply to the active input power (ac) required to produce the total active output power.

“Ambient temperature”: The temperature which is the air immediately surrounding the unit under test (UUT).

“Average Active-Mode Efficiency”: The average of the loading conditions (100%, 75%, 50%, and 25% of its nameplate output current) for which it can sustain the output current.

“Manual on-off switch”: a switch activated by the user to control power reaching the device. This term does not apply to any mechanical, optical, or electronic switches that automatically disconnect mains power from the device when a load is disconnected from the device, or that control power to the load itself.

“Power Factor (True), PF”: The true power factor is the ratio of the active or real power (P) consumed in watts to the apparent power (S), drawn in volt-amperes (VA).

“Crest Factor, CF”: The measured peak current drawn by the product divided by the measured r.m.s current drawn by the product.

“Nameplate output current”: The current output of the power supply as specified by the manufacturer on the label on the housing of the power supply, if absent from the housing, as provided by the manufacturer. This is also called rated output current. Alternatively, it is the nameplate output power divided by nameplate output voltage.

“Nameplate output power”: the power output of the power supply as specified on the manufacturer's label on the power supply housing or, if absent from the housing, as specified in documentation provided by the manufacturer, or calculated by multiplying the nameplate output voltage by the nameplate output current ($V \cdot A$).

“Nameplate Output Voltage”: The voltage output of the power supply as specified by the manufacturer on the label on the housing of the power supply (either dc or ac). This is also called rated output voltage.

“No load”: the mode of operation when an external power supply is connected to the main electricity supply and the output is not connected to a load.

Note: No-load modes include Standby mode and OFF mode.

“No-load power”: the wattage of active power (ac) consumed by a power supply operating in the no-load condition.

“Off mode”: the condition, applicable only to units with manual on-off switches, in which the external power supply is (1) connected to the main electricity supply; (2) the output is not connected to any load; and (3) all manual on-off switches are turned off.

“Basic-Voltage external power supply”: An external power supply is not a low-voltage external power supply.

“Low voltage external power supply”: An external power supply with a nameplate output voltage of less than 6 volts and a nameplate output current greater than or equal to 550 milliamperes.

“Direct Operation external power supply”: An external power supply can operate a consumer product that is not a battery charger without the assistance of a battery.

“Indirect Operation external power supply”: An external power supply cannot operate a consumer product that is not a battery charger without the assistance of a battery.

“Adaptive external power supply”: An external power supply that can alter its output voltage during active-mode based on an established digital communication protocol with the end-use application without any user-generated action.

TECHNICIAN'S REFERENCE PAGE (Cont'd)

“Switch-selectable single voltage external power supply”: A single-voltage AC-AC or AC-DC power supply that allows users to choose from more than one output voltage.

“Maximum Current Ratio (MCR)”: Crest Factor (CF)/Power Factor (PF)

POWER MEASUREMENT EQUIPMENT AND UNCERTAINTY

Any power measurements recorded, as well as any power measurement equipment utilized for testing, shall conform to the following:

Resolution and Uncertainty requirements are outlined in Section 4, “General conditions for measurements,” as well as Annexes B, “Notes on the measurement of low power modes,” and Annexes D, “Determination of uncertainty of measurement,” of IEC 62301:2011 (incorporated by reference; see §430.3) and EN50564:2011.

EFFICIENCY CALCULATION

Efficiency shall be calculated by dividing the UUT's measured active output power at a given load condition by the active ac input power measured at that load condition. Average efficiency shall also be calculated and reported as the arithmetic mean of the efficiency values calculated at Load Conditions 1, 2, 3, and 4 in Table 1. This is a simple arithmetic average of active mode efficiency values, and is not intended to represent weighted average efficiency, which would vary according to the duty cycle of the product powered by the UUT.

POWER CONSUMPTION CALCULATION

Power consumption of the UUT at each Load Condition 1 – 4 is the difference between the active output power (W) at that Load Condition and the ac active input power (W) at that Load Condition. The power consumption of Load Condition 5 (no load) is equal to the ac active input power (W) at that Load Condition.

TECHNICIAN'S REFERENCE PAGE (Cont'd)

General sampling requirements for selecting units to be tested. (10 CFR Part 429 Subpart B, 429.11)

(a) When testing of covered products or covered equipment is required to comply with section 323(c) of the Act, or to comply with rules prescribed under section 324, 325, or 342, 344, 345 or 346 of the Act, a sample comprised of production units (or units representative of production units) of the basic model being tested must be selected at random and tested, and must meet the criteria found in §§429.14 through 429.62 of this subpart. Components of similar design may be substituted without additional testing if the substitution does not affect energy or water consumption. Any represented values of measures of energy efficiency, water efficiency, energy consumption, or water consumption for all individual models represented by a given basic model must be the same, except for central air conditioners and central air conditioning heat pumps, as specified in §429.16 of this subpart.

(b) The minimum number of units tested shall be no less than two, except where:

(1) A different minimum limit is specified in §§429.14 through 429.65 of this subpart; or

(2) Only one unit of the basic model is produced, in which case, that unit must be tested and the test results must demonstrate that the basic model performs at or better than the applicable standard(s). If one or more units of the basic model are manufactured subsequently, compliance with the default sampling and representations provisions is required.

Sampling plan for External Power Supplies (10 CFR Part 429 Subpart B, 429.37)

(a) Sampling plan for selection of units for testing. (1) The requirements of §429.11 are applicable to external power supplies; and

(2) For each basic model of external power supply selected for testing, a sample of sufficient size shall be randomly selected and tested to ensure that—

(i) Any represented value of the estimated energy consumption of a basic model for which consumers would favor lower values shall be greater than or equal to the higher of:

(A) The mean of the sample, where:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i, \text{ and } \bar{x} \text{ is the sample mean; } n \text{ is the number of samples; and } x_i \text{ is the } i^{\text{th}} \text{ sample;}$$

Or,

(B) The upper 97.5 percent confidence limit (UCL) of the true mean divided by 1.05, where:

$$UCL = \bar{x} + t_{.975} \left(\frac{s}{\sqrt{n}} \right) \text{ And } \bar{x} \text{ is the sample mean; } s \text{ is the sample standard deviation; } n \text{ is the number of sample;}$$

and $t_{0.975}$ is the t statistic for a 97.5% one – tailed confidence interval with $n - 1$ degrees of freedom (from Appendix A).

and

(ii) Any represented value of the estimated energy consumption of a basic model for which consumers would favor higher values shall be less than or equal to the lower of:

(A) The mean of the sample, where:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i, \text{ and } \bar{x} \text{ is the sample mean; } n \text{ is the number of samples; and } x_i \text{ is the } i^{\text{th}} \text{ sample;}$$

Or,

(B) The lower 97.5 percent confidence limit (LCL) of the true mean divided by 0.95, where:

$$LCL = \bar{x} - t_{.975} \left(\frac{s}{\sqrt{n}} \right) \text{ And } \bar{x} \text{ is the sample mean; } s \text{ is the sample standard deviation; } n \text{ is the number of sample;}$$

and $t_{0.975}$ is the t statistic for a 97.5% one – tailed confidence interval with $n - 1$ degrees of freedom (from Appendix A).

TECHNICIAN'S REFERENCE PAGE (Cont'd)**Appendix A to Subpart B of Part 429—Student's t-Distribution Values for Certification Testing**

[One-Sided]

Degrees of freedom (from Appendix A)	Confidence Interval			
	90%	95%	97.5%	99%
1	3.078	6.314	12.71	31.82
2	1.886	2.920	4.303	6.965
3	1.638	2.353	3.182	4.541
4	1.533	2.132	2.776	3.747
5	1.476	2.015	2.571	3.365
6	1.440	1.943	2.447	3.143
7	1.415	1.895	2.365	2.998
8	1.397	1.860	2.306	2.896
9	1.383	1.833	2.262	2.821
10	1.372	1.812	2.228	2.764
11	1.363	1.796	2.201	2.718
12	1.356	1.782	2.179	2.681
13	1.350	1.771	2.160	2.650
14	1.345	1.761	2.145	2.624
15	1.341	1.753	2.131	2.602
16	1.337	1.746	2.120	2.583
17	1.333	1.740	2.110	2.567
18	1.330	1.734	2.101	2.552
19	1.328	1.729	2.093	2.539
20	1.325	1.725	2.086	2.528

TECHNICIAN'S REFERENCE PAGE (Cont'd)

INSTRUCTIONS – TEST PREPARATION AND LOADING

There shall be no intentional cooling of the UUT such as by use of separately powered fans, air conditioners, or heat sinks. The UUT shall be conditioned, rested, and tested on a thermally non-conductive surface. A readily available material such as Styrofoam will be sufficient.

Any built-in switch in the UUT controlling power flow to the AC input must be in the “on” position for this measurement.

Test power supplies packaged for consumer use to power a product with the DC output cord supplied by the manufacturer. There are two options for connecting metering equipment to the output of this type of power supply: Cut the cord immediately adjacent to the DC output connector, or attach leads and measure the efficiency from the output connector itself.

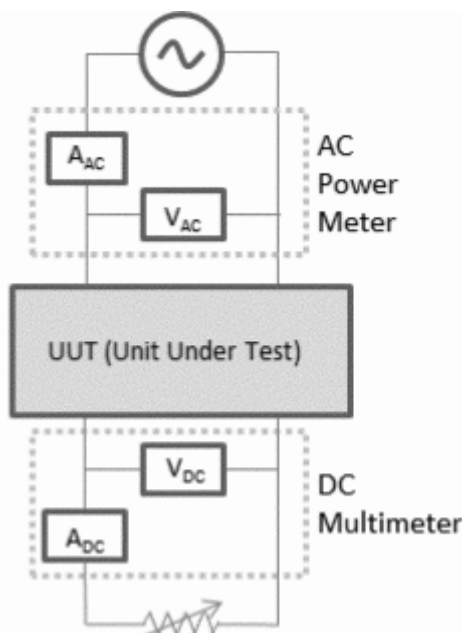
If the power supply is attached directly to the product that it is powering, cut the cord immediately adjacent to the powered product and connect DC measurement probes at that point. Any additional metering equipment such as voltmeters and/or ammeters used in conjunction with resistive or electronic loads must be connected directly to the end of the output cable of the UUT.

If the product has more than two output wires, including those that are necessary for controlling the product, the manufacturer must supply a connection diagram or test fixture that will allow the testing laboratory to put the unit under test into active-mode. Figure 1 provides one illustration of how to set up an EPS for test.

In order to load the power supply to produce all four active-mode load conditions, use a set of variable resistive or electronic loads. Although these loads may have different characteristics than the electronic loads power supplies are intended to power, they provide standardized and readily repeatable references for testing and product comparison.

Note that resistive loads need not be measured precisely with an ohmmeter; simply adjust a variable resistor to the point where the ammeter confirms that the desired percentage of nameplate output current is flowing. For electronic loads, adjust the desired output current in constant current (CC) mode rather than adjusting the required output power in constant power (CP) mode.

Figure 1 – Example connection diagram for EPS efficiency measurement.



ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:

TESTING SEQUENCE:

The UUT shall be tested at each load condition specified in Table 1, testing consecutively from Load Condition 1 to 5. The UUT shall be operated at 100% of nameplate current output (Load Condition 1) for at least 30 minutes immediately prior to conducting efficiency measurements.

For the agencies other than NRCan/Quebec, after this warm-up period, the technician shall monitor AC input power for a period of 5 minutes to assess the stability of the UUT. If the power level does not drift by more than 5% from the maximum value observed, the UUT can be considered stable and the measurements can be recorded at the end of the 5 minute period. Subsequent load conditions (see Table 1) can then be measured under the same 5 minute stability guidelines. Note that only one warm-up period of 30 minutes is required for each UUT at the beginning of the test procedure.

If AC input power is not stable over a 5 minute period, the technician shall follow the guidelines established by IEC 62301⁽¹⁾ for measuring average power or accumulated energy over time for both ac input and dc output. Specifically in EU Directive for ErP, the stability shall be determined in accordance with EN 50564:2011, 5.3. Efficiency measurements shall be conducted in sequence from Load Condition 1 to Load Condition 5 as indicated in Table 1. If testing of additional, optional load conditions is desired, that testing should be conducted in accordance with this test procedure and subsequent to completing the sequence described above.

For NRCan/Quebec, the regulations will provide this flexibility by allowing external power supplies to be tested to either the Canadian test standard (CAN/CSA C381.1) or the U.S. test procedure Appendix Z (the agencies other than NRCan/Quebec). If follow Canadian test standard, the UUT shall be operated for 30 minutes at each load condition prior to measurement. The input and output power shall be measured using the Accumulated Energy Approach specified in CAN/CSA 62301 clause 5.3.2b) for at least 5 minutes. No load power shall be recorded for Load Condition 5.

NOTE: To ensure consistent unit, it is recommended that watt-hours and hours be used above, to give watts.

For Australia/New Zealand requirements, if the power supply nameplate input voltage is 240V only, conduct the testing at 240V ac, 50Hz and record in the 230V ac tables for ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST. The testing voltage, 240V ac, 50 Hz shall be recorded.

The above testing sequence shall be repeated on three UUT in total of the same model.

Test switch-selectable single-voltage external power supplies twice, once at the highest nameplate output voltage and once at the lowest.

Test adaptive external power supplies twice, once at the highest achievable output voltage and once at the lowest.

⁽¹⁾Same as AS/NZS 62301.

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)**Table 1 – Load Conditions**

Load Conditions for UUT	Percentage of Nameplate Output Current
1	100% $\pm$ 2% ⁽²⁾
2	75% $\pm$ 2%
3	50% $\pm$ 2%
4	25% $\pm$ 2%
5	0%
Note(s): 1. ⁽²⁾ The 2% allowance is of nameplate output current, not of the calculated current value. 2. For example, a UUT at Load Condition 3 may be tested in a range from 48% (min) to 52% (max) of rated output current. 3. It is mandatory for CoC. The UUT shall be considered 10% $\pm$ 2% of nameplate output current after load condition 4, warm up period is 0 minute and 5 minutes is for assessment period, and then continue load condition 5.	

Comments:

1. If instantaneous power measurement is acceptable, technician record the instantaneous power measurement under the column “**Avg. Power (W)” and then shall fill cells of columns “Wh” and “Wh Interval” with “-” or leave them “blank.”
2. If accumulated energy approach used, the average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes).

Tested by: Frank Lin Tested by: Frank Lin Test date: 2019-07-15
signature print
Sample #: 19AA0715001 Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS FOR SAMPLE 1 under CAN/CSA-C381.1-08 Test method for calculating the energy efficiency of single-voltage external ac-dc and ac-ac power supplies

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.2
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.11

External Power Supply Input Electric Data										External Power Supply Output Electric Data			
Load	V	Hz	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	114.77	60.00	0.525	0.5345	3.78300	0.22	2.6877	32.2524	5.00	9.08	3.11	2.3552	28.2625
2 (75%)	114.79	60.00	0.411	0.5125	3.89400	0.20	2.0066	24.0796	5.00	9.11	2.33	1.7685	21.2222
3 (50%)	114.80	60.00	0.288	0.4803	4.02200	0.17	1.3263	15.9160	5.00	9.13	1.55	1.1782	14.1381
4 (25%)	114.83	60.00	0.160	0.4313	4.37900	0.15	0.6599	7.9188	5.00	9.15	0.77	0.5845	7.0137
Optional (10%)	114.85	60.00	0.071	0.3836	4.79100	0.14	0.2602	3.1229	5.00	9.16	0.30	0.2299	2.7593
5 (0%)	114.87	60.00	0.013	0.0178	2.40900	0.12	0.0039	0.0233	10.00				

				Power Measurement Uncertainty Calculation and Judgement						
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.06	Accumulated Energy	--	7.078	0.300376	--	Complied	--	--	--
2 (75%)	0.33	Accumulated Energy	--	7.598	0.191810	--	Complied	--	--	--
3 (50%)	0.08	Accumulated Energy	--	8.374	0.157004	--	Complied	--	--	--
4 (25%)	0.10	Accumulated Energy	--	10.153	0.082508	0.020245	--	--	Complied	--
Optional (10%)	0.13	Accumulated Energy	--	12.490	0.034721	0.023984	--	--	Complied	--
5 (0%)	21.65	Sampling	-59.58E-9	135.337	0.006403	0.220539	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
3.9899	2.8574	1.7779	0.9051	0.3636	0.0233

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 ~ 4
87.62914	88.1335	88.8295	88.5702	88.357	88.29059479

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin Tested by: Frank Lin Test date: 2019-07-15
signature print
Sample #: 19AA0715002 Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS FOR SAMPLE 2 under CAN/CSA-C381.1-08 Test method for calculating the energy efficiency of single-voltage external ac-dc and ac-ac power supplies

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.2
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.11

Load	External Power Supply Input Electric Data									External Power Supply Output Electric Data			
	V	HZ	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	114.76	60.00	0.520	0.5395	3.52900	0.20	2.6817	32.1803	5.00	9.06	3.11	2.3476	28.1711
2 (75%)	114.78	60.00	0.406	0.5153	3.70700	0.18	2.0040	24.0478	5.00	9.08	2.33	1.7627	21.1520
3 (50%)	114.80	60.00	0.286	0.4844	3.99600	0.15	1.3257	15.9079	5.00	9.10	1.55	1.1743	14.0922
4 (25%)	114.83	60.00	0.159	0.4349	4.35000	0.14	0.6607	7.9286	5.00	9.12	0.77	0.5837	7.0049
Optional (10%)	114.86	60.00	0.072	0.3804	4.76400	0.13	0.2619	3.1424	5.00	9.13	0.30	0.2294	2.7532
5 (0%)	114.87	60.00	0.013	0.0183	2.39700	0.12	0.0042	0.0251	10.00				

				Power Measurement Uncertainty Calculation and Judgement						
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.03	Accumulated Energy	--	6.541	0.298716	--	Complied	--	--	--
2 (75%)	0.09	Accumulated Energy	--	7.194	0.191061	--	Complied	--	--	--
3 (50%)	0.07	Accumulated Energy	--	8.249	0.156322	--	Complied	--	--	--
4 (25%)	0.28	Accumulated Energy	--	10.002	0.082226	0.020003	--	--	Complied	--
Optional (10%)	0.16	Accumulated Energy	--	12.524	0.034993	0.024038	--	--	Complied	--
5 (0%)	13.49	Sampling	-103.68E-9	130.984	0.006535	0.213574	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
4.0092	2.8958	1.8157	0.9237	0.3892	0.0251

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 - 4
87.54145	87.9582	88.5862	88.3498	87.6146	88.1088551

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin Tested by: Frank Lin Test date: 2019-07-15
signature print
Sample #: 19AA0715003 Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS FOR SAMPLE 3 under CAN/CSA-C381.1-08 Test method for calculating the energy efficiency of single-voltage external ac-dc and ac-ac power supplies

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.2
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.11

Load	External Power Supply Input Electric Data									External Power Supply Output Electric Data			
	V	HZ	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	114.77	60.00	0.515	0.5422	3.41500	0.19	2.6691	32.0291	5.00	9.02	3.10	2.3365	28.0386
2 (75%)	114.78	60.00	0.402	0.5191	3.66100	0.17	1.9950	23.9399	5.00	9.05	2.33	1.7546	21.0546
3 (50%)	114.80	60.00	0.283	0.4872	4.01800	0.15	1.3176	15.8113	5.00	9.07	1.54	1.1685	14.0223
4 (25%)	114.84	60.00	0.157	0.4365	4.36700	0.13	0.6560	7.8719	5.00	9.09	0.77	0.5798	6.9574
Optional (10%)	114.86	60.00	0.071	0.3790	4.76900	0.13	0.2592	3.1098	5.00	9.11	0.30	0.2264	2.7168
5 (0%)	114.87	60.00	0.013	0.0164	2.42000	0.12	0.0038	0.0227	10.00				

				Power Measurement Uncertainty Calculation and Judgement						
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.03	Accumulated Energy	--	6.298	0.297315	--	Complied	--	--	--
2 (75%)	0.10	Accumulated Energy	--	7.053	0.189745	--	Complied	--	--	--
3 (50%)	0.13	Accumulated Energy	--	8.247	0.155399	--	Complied	--	--	--
4 (25%)	0.27	Accumulated Energy	--	10.005	0.081759	0.020008	--	--	Complied	--
Optional (10%)	0.23	Accumulated Energy	--	12.583	0.034851	0.024133	--	--	Complied	--
5 (0%)	12.70	Sampling	-62.20E-9	147.561	0.006561	0.240098	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
3.9905	2.8853	1.789	0.9145	0.393	0.0227

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 - 4
87.54102	87.9477	88.6853	88.3827	87.3625	88.13919724

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin Tested by: Frank Lin Test date: 2019-07-15
signature print
Sample #: 19AA0715001 Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS FOR SAMPLE 1 under test method other than CAN/CSA-C381.1-08, NOM-029

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.2
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.11

External Power Supply Input Electric Data										External Power Supply Output Electric Data			
Load	V	Hz	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	114.76	60.00	0.525	0.5409	3.73000	0.22	2.6874	32.2488	5.00	9.08	3.11	2.3553	28.2633
2 (75%)	114.78	60.00	0.410	0.5109	3.88100	0.20	2.0052	24.0624	5.00	9.10	2.33	1.7684	21.2210
3 (50%)	114.82	60.00	0.292	0.4811	4.11300	0.16	1.3254	15.9049	5.00	9.13	1.55	1.1782	14.1388
4 (25%)	114.85	60.00	0.163	0.4265	4.52200	0.14	0.6601	7.9211	5.00	9.15	0.77	0.5845	7.0139
Optional (10%)	114.86	60.00	0.072	0.3794	4.80200	0.13	0.2602	3.1228	5.00	9.16	0.30	0.2299	2.7584
5 (0%)	114.87	60.00	0.013	0.0170	2.40300	0.13	0.0040	0.0239	10.00				

Power Measurement Uncertainty Calculation and Judgement										
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	3.63	Accumulated Energy	--	6.896	0.298665		Complied	--	--	--
2 (75%)	0.12	Accumulated Energy	--	7.596	0.192069		Complied	--	--	--
3 (50%)	0.94	Accumulated Energy	--	8.549	0.156821		Complied	--	--	--
4 (25%)	2.29	Accumulated Energy	--	10.603	0.082978	0.020965	--	--	Complied	--
Optional (10%)	1.60	Accumulated Energy	--	12.657	0.034915	0.024251	--	--	Complied	--
5 (0%)	11.33	Sampling	41.45E-9	141.353	0.006602	0.230165	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
3.9855	2.8414	1.7661	0.9072	0.3644	0.0239

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 ~ 4
87.641401	88.19154	88.89587	88.54705	88.33099	88.31896401

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin Tested by: Frank Lin Test date: 2019-07-15
signature print
Sample #: 19AA0715002 Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS FOR SAMPLE 2 under test method other than CAN/CSA-C381.1-08, NOM-029

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.2
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.11

External Power Supply Input Electric Data										External Power Supply Output Electric Data			
Load	V	Hz	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	114.78	60.00	0.521	0.5380	3.56500	0.19	2.6813	32.1760	5.00	9.06	3.11	2.3476	28.1717
2 (75%)	114.78	60.00	0.407	0.5151	3.74600	0.19	2.0023	24.0276	5.00	9.08	2.33	1.7628	21.1541
3 (50%)	114.83	60.00	0.289	0.4838	4.10200	0.14	1.3255	15.9065	5.00	9.11	1.54	1.1745	14.0935
4 (25%)	114.85	60.00	0.161	0.4268	4.45000	0.13	0.6596	7.9154	5.00	9.12	0.77	0.5839	7.0064
Optional (10%)	114.87	60.00	0.072	0.3781	4.78700	0.12	0.2619	3.1425	5.00	9.14	0.30	0.2295	2.7544
5 (0%)	114.87	60.00	0.013	0.0182	2.41500	0.13	0.0043	0.0260	10.00				

				Power Measurement Uncertainty Calculation and Judgement						
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.78	Accumulated Energy	--	6.626	0.299091	--	Complied	--	--	--
2 (75%)	0.54	Accumulated Energy	--	7.272	0.191005	--	Complied	--	--	--
3 (50%)	1.66	Accumulated Energy	--	8.479	0.156409	--	Complied	--	--	--
4 (25%)	0.15	Accumulated Energy	--	10.426	0.082917	0.020682	--	--	Complied	--
Optional (10%)	0.19	Accumulated Energy	--	12.661	0.035102	0.024258	--	--	Complied	--
5 (0%)	12.27	Sampling	98.43E-9	132.692	0.006653	0.216307	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
4.0043	2.8735	1.813	0.909	0.3881	0.026

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 ~ 4
87.55501	88.0408	88.6021	88.5161	87.65	88.17851185

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin Tested by: Frank Lin Test date: 2019-07-15
signature print
Sample #: 19AA0715003 Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS FOR SAMPLE 3 under test method other than CAN/CSA-C381.1-08, NOM-029

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.2
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.11

External Power Supply Input Electric Data										External Power Supply Output Electric Data			
Load	V	Hz	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	114.75	60.00	0.515	0.5424	3.41600	0.21	2.6690	32.0285	5.00	9.02	3.10	2.3366	28.0389
2 (75%)	114.80	60.00	0.404	0.5184	3.71100	0.17	1.9931	23.9172	5.00	9.05	2.32	1.7544	21.0530
3 (50%)	114.83	60.00	0.285	0.4865	4.09100	0.14	1.3173	15.8073	5.00	9.07	1.54	1.1685	14.0220
4 (25%)	114.85	60.00	0.160	0.4371	4.45000	0.13	0.6561	7.8738	5.00	9.09	0.77	0.5797	6.9562
Optional (10%)	114.86	60.00	0.072	0.3772	4.87400	0.12	0.2592	3.1104	5.00	9.11	0.30	0.2264	2.7168
5 (0%)	114.88	60.00	0.013	0.0193	2.40900	0.13	0.0040	0.0239	10.00				

				Power Measurement Uncertainty Calculation and Judgement						
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.53	Accumulated Energy	--	6.298	0.297260	--	Complied	--	--	--
2 (75%)	0.13	Accumulated Energy	--	7.159	0.189782	--	Complied	--	--	--
3 (50%)	1.69	Accumulated Energy	--	8.409	0.155486	--	Complied	--	--	--
4 (25%)	3.13	Accumulated Energy	--	10.181	0.081714	0.020290	--	--	Complied	--
Optional (10%)	0.10	Accumulated Energy	--	12.922	0.034940	0.024675	--	--	Complied	--
5 (0%)	17.26	Sampling	265.83E-9	124.819	0.006267	0.203710	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
3.9896	2.8642	1.7853	0.9176	0.3936	0.0239

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 ~ 4
87.54359	88.0245	88.7059	88.3462	87.3457	88.15503092

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin Tested by: Frank Lin Test date: 2019-07-15
signature print
Sample #: 19AA0715001 Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A, #29,Max.80V,60A, #30,Max.80V,60A, #31,Max.80V,60A, #32,Max.80V,60A,

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS FOR SAMPLE 1 under test method other than CAN/CSA-C381.1-08, NOM-029

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.2
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 3.11

External Power Supply Input Electric Data										External Power Supply Output Electric Data			
Load	V	Hz	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	229.80	50.00	0.347	0.4034	5.06500	0.23	2.6776	32.1315	5.00	9.08	3.11	2.3554	28.2645
2 (75%)	229.81	50.00	0.268	0.3914	5.17200	0.22	2.0012	24.0139	5.00	9.10	2.33	1.7687	21.2250
3 (50%)	229.79	50.00	0.183	0.3781	5.13600	0.20	1.3269	15.9223	5.00	9.13	1.55	1.1781	14.1369
4 (25%)	229.80	50.00	0.098	0.3526	5.20000	0.16	0.6603	7.9232	5.00	9.15	0.76	0.5841	7.0090
Optional (10%)	229.80	50.00	0.047	0.2927	5.76300	0.15	0.2655	3.1864	5.00	9.16	0.30	0.2294	2.7534
5 (0%)	229.80	50.00	0.019	0.0087	2.00300	0.15	0.0031	0.0367	5.00				

				Power Measurement Uncertainty Calculation and Judgement						
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.06	Accumulated Energy	--	12.556	0.343964	0.024090	--	--	Complied	--
2 (75%)	0.63	Accumulated Energy	--	13.214	0.298939	0.025142	--	--	Complied	--
3 (50%)	0.25	Accumulated Energy	--	13.584	0.176854	0.025734	--	--	Complied	--
4 (25%)	0.05	Accumulated Energy	--	14.748	0.083940	0.027597	--	--	Complied	--
Optional (10%)	0.06	Accumulated Energy	--	19.689	0.040598	0.035502	--	--	Complied	--
5 (0%)	4.91	Accumulated Energy	--	230.230	0.016001	0.372368	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
3.867	2.7889	1.7854	0.9142	0.433	0.0367

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 ~ 4
87.965081	88.38631	88.7868	88.46173	86.411	88.39997978

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin Tested by: Frank Lin Test date: 2019-07-15
signature print
Sample #: 19AA0715002 Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A, #29,Max.80V,60A, #30,Max.80V,60A, #31,Max.80V,60A, #32,Max.80V,60A,

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS FOR SAMPLE 2 under test method other than CAN/CSA-C381.1-08, NOM-029

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.2
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 3.11

External Power Supply Input Electric Data										External Power Supply Output Electric Data			
Load	V	HZ	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	229.80	50.00	0.337	0.4144	4.79700	0.22	2.6741	32.0897	5.00	9.06	3.10	2.3481	28.1772
2 (75%)	229.79	50.00	0.259	0.4092	4.74900	0.20	2.0030	24.0357	5.00	9.08	2.33	1.7630	21.1564
3 (50%)	229.79	50.00	0.179	0.3865	4.81900	0.18	1.3236	15.8837	5.00	9.11	1.54	1.1742	14.0906
4 (25%)	229.79	50.00	0.098	0.3535	5.08600	0.16	0.6612	7.9339	5.00	9.13	0.76	0.5829	6.9951
Optional (10%)	229.80	50.00	0.048	0.2883	5.84900	0.15	0.2674	3.2089	5.00	9.14	0.30	0.2286	2.7426
5 (0%)	229.80	50.00	0.019	0.0077	2.01100	0.14	0.0027	0.0323	5.00				

Power Measurement Uncertainty Calculation and Judgement										
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.03	Accumulated Energy	--	11.576	0.339083	0.022522	--	--	Complied	--
2 (75%)	1.67	Accumulated Energy	--	11.606	0.293245	0.022570	--	--	Complied	--
3 (50%)	0.25	Accumulated Energy	--	12.468	0.174631	0.023949	--	--	Complied	--
4 (25%)	0.04	Accumulated Energy	--	14.388	0.083891	0.027021	--	--	Complied	--
Optional (10%)	0.16	Accumulated Energy	--	20.288	0.041129	0.036461	--	--	Complied	--
5 (0%)	4.02	Accumulated Energy	--	261.169	0.015949	0.421870	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
3.9125	2.8793	1.7931	0.9388	0.4663	0.0323

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 ~ 4
87.807614	88.02074	88.71107	88.16723	85.46854	88.17666261

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin Tested by: Frank Lin Test date: 2019-07-15
signature print
Sample #: 19AA0715003 Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A, #29,Max.80V,60A, #30,Max.80V,60A, #31,Max.80V,60A, #32,Max.80V,60A,

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS FOR SAMPLE 3 under test method other than CAN/CSA-C381.1-08, NOM-029

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.2
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.11

External Power Supply Input Electric Data										External Power Supply Output Electric Data			
Load	V	HZ	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	229.80	50.00	0.326	0.4267	4.55000	0.21	2.6614	31.9373	5.00	9.02	3.10	2.3371	28.0447
2 (75%)	229.79	50.00	0.250	0.4218	4.26000	0.19	1.9886	23.8630	5.00	9.05	2.32	1.7539	21.0468
3 (50%)	229.79	50.00	0.174	0.3935	4.80800	0.16	1.3161	15.7929	5.00	9.07	1.54	1.1676	14.0111
4 (25%)	229.79	50.00	0.096	0.3564	5.03500	0.15	0.6568	7.8812	5.00	9.10	0.76	0.5784	6.9412
Optional (10%)	229.80	50.00	0.049	0.2822	5.90900	0.14	0.2651	3.1809	5.00	9.11	0.30	0.2252	2.7023
5 (0%)	229.80	50.00	0.019	0.0088	2.01600	0.15	0.0030	0.0363	5.00				

Power Measurement Uncertainty Calculation and Judgement										
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.41	Accumulated Energy	--	10.663	0.333289	0.021061	--	--	Complied	--
2 (75%)	1.76	Accumulated Energy	--	10.100	0.213385	0.020160	--	--	Complied	--
3 (50%)	0.06	Accumulated Energy	--	12.219	0.172483	0.023550	--	--	Complied	--
4 (25%)	0.05	Accumulated Energy	--	14.127	0.083145	0.026603	--	--	Complied	--
Optional (10%)	0.09	Accumulated Energy	--	20.939	0.041399	0.037502	--	--	Complied	--
5 (0%)	4.95	Accumulated Energy	--	229.091	0.015824	0.370546	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
3.8926	2.8162	1.7818	0.94	0.4786	0.0363

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 ~ 4
87.811744	88.19847	88.71771	88.07288	84.95394	88.20020178

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin Tested by: Frank Lin Test date: 2019-07-15
signature print
Sample # : 19AA0715001 , Instrument Code / Range:
19AA0715002 ,
19AA0715003

OFF MODE POWER CONSUMPTION TEST:

If the external power supply UUT incorporates manual ON-OFF switches, all manual ON-OFF switches shall be placed in the "OFF" position for the OFF mode measurement, and measure and record its power consumption at "Load Condition 5" in Table 1.

The UUT is considered stable if, over 5 minutes with samples taken at least once every second, the AC input power does not drift from the maximum value observed by more than 1 percent or 50 milliwatts, whichever is greater. Measure the off-mode power consumption of a switch-selectable single-voltage external power supply twice—once at the highest nameplate output voltage and once at the lowest.

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.2
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.11

External Power Supply Input Electric Data												
sample #	V	HZ	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	Stability Assessment %	*Measurement method used	Slope value (mW/h)

Power Measurement Uncertainty Calculation and Judgement							
sample #	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX (0.02W or Upc*Pm)
				--	--	--	--
				--	--	--	--
				--	--	--	--
				--	--	--	--
				--	--	--	--
				--	--	--	--

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Base on Table 2, this results is[greater than] [not greater than] _____ Watt as Maximum Energy Consumption in No-Load Mode.

Tested by: Frank Lin Tested by: Frank Lin Test date: 2019-07-15
signature print
Sample # : 19AA0715001 , Instrument Code / Range:
19AA0715002 ,
19AA0715003

DURABILITY OF MARKING TEST for NOM-029-ENER-2017

METHOD

A sample of the marking label was subjected to this test. The surface of each marking as noted below was rubbed by hand for a period of 15 seconds with a water soaked cloth.

RESULTS

TEST OBSERVATIONS:	
	Water
Any Damage?	
Legible?	
Curled?	
Edge Lifted?	
Easily Removed Intact?	

The marking [was] [was not] durable and legible. The label [was] [was not] easily removed and [did] [did not] show curling.

Comments:

WORKSHEETS

The measured is the following:

[X] International Efficiency Marking Protocol (IEMP) for External Power Supplies: (at 115/230V ac, 60/50 Hz)

	Efficiency (%):	Sample No.:
Minimum Average Efficiency in Active Mode	88.15	19AA0715003
Maximum Power In No-Load Condition	0.0367	19AA0715001
Base on Table 2, this EPS is complied with the requirements for level: <u>VI</u> at 115V ac; level: <u>VI</u> at 230V ac; The calculated Minimum Average Efficiency in Active Mode is: <u>0.867</u> (86.7 %) at 115V ac; <u>0.867</u> (86.7 %) at 230V ac and Maximum Energy Consumption in No-Load Mode is not greater than <u>0.100</u>Watt at 115V ac; <u>0.100</u>Watt at 230V ac. ☐ The true power factor was 0.9 or greater at 100% of rated load when tested at 115V, 60Hz. This requirement applies only to Level V power supplies with input power greater than or equal to 100W at 115V, 60Hz.		

[X]Canada NRCan/Quebec and US CEC requirements for external power supply: (at 115V ac, 60 Hz)

CAN/CSA-C381.1-08	Efficiency (%):	Sample No.:
Minimum Average Efficiency in Active Mode	--	--
Maximum Power In No-Load Condition	--	--
10 CFR Appendix Z to Subpart B of Part 430	Efficiency (%):	Sample No.:
Minimum Average Efficiency in Active Mode	88.15	19AA0715003
Maximum Power In No-Load Condition	0.0260	19AA0715002
Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is: <u>0.867</u> (86.7%), and Maximum Energy Consumption in No-Load Mode is not greater than <u>0.1</u> Watt. This comply with requirements in: ☐ Amendment 13 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II ☒ Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances		

WORKSHEETS (CONT'D)**[X] US DoE Requirements for external power supply: (at 115V ac, 60Hz)****The sampling plan calculation following 10CFR 429.1 and 429.37**

	Sample mean	*LCL/0.95	The lower of sample mean or LCL/0.95
Active mode	0.882	0.926	0.882
	Sample mean	**UCL/1.05	The higher of sample mean or UCL/1.05
No load mode	0.0246	0.0263	0.0263

* the lower 97.5 percent confidence limit (LCL) of the true mean divided by 0.95

** the upper 97.5 percent confidence limit (UCL) of the true mean divided by 1.05

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is: 0.867 (86.7%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.100 Watt.

Any represented value of the estimated energy consumption of a basic model in Active Mode could be certified in the following range.

Based on Table 2, the calculated Minimum Average Efficiency		The represented value [declared by manufacturer]		Based on sampling plan, the higher of sample mean or LCL/0.95
0.867	≤	0.8815	≤	0.882

Any represented value of the estimated energy consumption of a basic model in No-Load condition could be certified in the following range.

Based on sampling plan, the lower of sample mean or UCL/1.05		The represented value [declared by manufacturer]		Based on table 2, the Maximum Energy Consumption
0.0263	≤	0.0265	≤	0.100

This comply with requirements in:

[X] Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430

[X] California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609

[X] Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II

[] Others: _____

[] MEXICO : NORMA Official Mexicana NOM-029-ENER-2017: (at 127V ac, 60 Hz)

	Efficiency (%):	Sample No.:
Minimum Average Efficiency in Active Mode	--	--
Maximum Power In No-Load Condition	--	--

Base on Table 11, the calculated Minimum Average Efficiency in Active Mode is: _____ (_____%), and Maximum Energy Consumption in No-Load Mode is not greater than _____ Watt.

This with requirements for **NOM-029-ENER-2017, Eficiencia energética de fuentes de alimentación externa. Límites, métodos de prueba, marcado y etiquetado.**

WORKSHEETS (CONT'D)

[X] Australian GEMS and New Zealand MEPS: (at 230V ac or 240V ac, 50Hz)

[X] European Union (EU) Energy-related Products (ErP): (at 230V ac, 50Hz)

[X] European Union (EU) Code of Conduct: (at 230V ac, 50Hz)

[] Others: _____

Input Voltage(V ac): 230V ac, 50 Hz	Efficiency (%):	Sample No.:
Minimum Average Efficiency in ActiveMode	88.17	19AA0715002
Minimum 10% Load Average Efficiency in Active Mode	84.95	19AA0715003
Maximum Power In No-Load Condition	0.0367	19AA0715001
[] Input Voltage(V ac): 240 V ac, 50 Hz	Efficiency (%):	Sample No.:
Minimum Average Efficiency in ActiveMode	--	--
Maximum Power In No-Load Condition	--	--

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is: 0.831 (83.1%), and MaximumEnergyConsumption in No-Load Mode is not greater than 0.300Watt.

This[comply] [~~does not comply~~]with performance mark [III] ; [IV] ; [V]requirements in:

**Australian Greenhouse and Energy Minimum Standards (External Power Supplies)
Determination 2014 and New Zealand Energy Efficiency (Energy Using Products) Regulations
2002**

Note:

For **Australian**, according to Clause 8(1)(b) in Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014, if a product exceeds the energy performance requirements for Mark V as mentioned in Appendix A of AS/NZS 4665.1:2005 and meets the performance requirements for Mark VI mentioned in the IEMP then the product may be labelled in accordance with the requirements for:

(i) Mark V mentioned in Appendix A of AS/NZS 4665.1:2005 and sections 4.2 and 5 of AS/NZS 4665.2:2005 (Energy Performance Mark); or (ii) Mark VI mentioned in the IEMP.

Base on Table 3, 4 and 5, the calculated Minimum Average Efficiency in Active Mode is: 0.832 (83.2%), and MaximumEnergyConsumption in No-Load Mode is not greater than 0.3Watt.

This[comply] [~~does not comply~~]with requirements for **EU Directive for Energy-related Products 2009/125/EC and Implementing Measure no. EC 278/2009 for External Power Supply.**

Base on Table 6, 7, 8, 9, and 10, the calculated Minimum Average Efficiency in Active Mode is: 0.874 (87.4%), at 10% Load is: 0.774 (77.4%), and MaximumEnergyConsumption in No-Load Mode is not greater than 0.075Watt.

This[comply] [~~does not comply~~]with requirements for **Code of Conduct on Energy Efficiency of External Power Supplies, Version 5.**

Table 2: International Efficiency Marking Protocol for External Power Supplies, Version 3.0

Mark	Performance Requirements				
	Nameplate Output Power (P_{no}) ²	No-Load Mode Power ³	Nameplate Output Power (P_{no})	Average Efficiency in Active Mode ⁴	Power Factor
I	Used if none of the other criteria are met.				
II	0 to ≤ 10 W	≤ 0.75	0 to < 1 W	$\geq 0.39 * P_{no}$	Not Applicable
	> 10 to 250 W	≤ 1.0	1 to < 49 W	$\geq 0.107 * \ln(P_{no}) + 0.39$	
			> 49 W	≥ 0.82	
III	0 to < 10 W	≤ 0.5	0 to 1 W	$\geq 0.49 * P_{no}$	Not Applicable
	10 to 250 W	≤ 0.75	> 1 to 49 W	$\geq 0.09 * \ln(P_{no}) + 0.49$	
			> 49 to 250 W	≥ 0.84	
IV	0 to 250 W	≤ 0.5	0 to < 1 W	$\geq 0.5 * P_{no}$	Not Applicable
			1 to 51 W	$\geq 0.09 * \ln(P_{no}) + 0.5$	
			> 51 to 250 W	≥ 0.85	
V	0 to < 50 W	AC-DC: ≤ 0.3 AC-AC: ≤ 0.5	0 to ≤ 1 W	Basic Voltage: $\geq 0.480 * P_{no} + 0.140$ Low Voltage ⁵ : $\geq 0.497 * P_{no} + 0.067$	EPSSs with ≥ 100 watts input power must have a true power factor ≥ 0.9 at 100% of rated load when tested at 115 volts/60Hz.
	≥ 50 to ≤ 250 W	≤ 0.5	> 1 to ≤ 49 W	Basic Voltage: $\geq 0.0626 * \ln(P_{no}) + 0.622$ Low Voltage: $\geq 0.0750 * \ln(P_{no}) + 0.561$	
			> 49 to 250 W	Basic Voltage: ≥ 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: $\geq 0.5 * P_{no} + 0.16$ Low Voltage: $\geq 0.517 * P_{no} + 0.087$	
			> 1 to ≤ 49 W	Basic Voltage: $\geq 0.071 * \ln(P_{no}) - 0.0014 * P_{no} + 0.67$ Low Voltage: $\geq 0.0834 * \ln(P_{no}) - 0.0014 * P_{no} + 0.609$	
	> 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	$\geq 0.497 * P_{no} + 0.067$	
			> 1 to ≤ 49 W	$\geq 0.075 * \ln(P_{no}) + 0.561$	
			> 49 W	≥ 0.860	
VII	Reserved for future use.				

² P_{no} 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.

Table 3: ErPEnergy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Standard Models

Nameplate Output Power (P_o)	Minimum Average Efficiency in Active Mode (expressed as a decimal)
0 to $\leq$ 1 Watt	$\geq 0.480 * P_o + 0.140$
> 1 to $\leq$ 51 Watts	$\geq [0.063 * \ln(P_o)] + 0.622$
> 51 Watts	≥ 0.870
Note: All efficiency values shall be rounded to the hundredths place.	

Table 4: ErP Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Low Voltage Models

Nameplate Output Power (P_o)	Minimum Average Efficiency in Active Mode (expressed as a decimal)
0 to $\leq$ 1 Watt	$\geq 0.497 * P_o + 0.067$
> 1 to $\leq$ 51 Watts	$\geq [0.0750 * \ln(P_o)] + 0.561$
> 51 Watts	≥ 0.860
Note: All efficiency values shall be rounded to the hundredths place.	

Table 5: ErPPower Consumption Criteria for No-Load

Nameplate Output Power (P_o)	Maximum Power in No-Load		
	Ac-Ac EPS	Ac-Dc EPS	Low Voltage EPS
0 to $\leq$ 51 watts	≤ 0.5 watts	≤ 0.3 watts	≤ 0.3 watts
> 51 watts	≤ 0.5 watts	≤ 0.5 watts	n/a

Table 6: CoCEnergy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum Four Point Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to $\leq$ 1 Watt	$\geq 0.500 * P_{no} + 0.146$	$\geq 0.500 * P_{no} + 0.169$
> 1 to $\leq$ 49 Watts	$\geq 0.0626 * \ln(P_{no}) + 0.646$	$\geq 0.071 * \ln(P_{no}) - 0.00115 * P_{no} + 0.670$
> 49 to $\leq$ 250 Watts	≥ 0.890	≥ 0.890
Note: All efficiency values shall be rounded to the hundredths place.		

Table 7: CoCEnergy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum Four Point Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to $\leq$ 1 Watt	$\geq 0.500 * P_{no} + 0.086$	$\geq 0.517 * P_{no} + 0.091$
> 1 to $\leq$ 49 Watts	$\geq 0.0755 * \ln(P_{no}) + 0.586$	$\geq 0.0834 * \ln(P_{no}) - 0.0011 * P_{no} + 0.609$
> 49 to $\leq$ 250 Watts	≥ 0.880	≥ 0.880
Note: All efficiency values shall be rounded to the hundredths place.		

Table 8: CoCEnergy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum 10% Load Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to $\leq$ 1 Watt	$\geq 0.500 * P_{no} + 0.046$	$\geq 0.5 * P_{no} + 0.060$
> 1 to ≤ 49 Watts	$\geq 0.0626 * \ln(P_{no}) + 0.546$	$\geq 0.071 * \ln(P_{no}) - 0.00115 * P_{no} + 0.570$
> 49 to ≤ 250 Watts	≥ 0.790	≥ 0.790
Note: All efficiency values shall be rounded to the hundredths place.		

Table 9: CoCEnergy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum 10% Load Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to $\leq$ 1 Watt	$\geq 0.500 * P_{no}$	$\geq 0.517 * P_{no}$
> 1 to ≤ 49 Watts	$\geq 0.072 * \ln(P_{no}) + 0.500$	$\geq 0.0834 * \ln(P_{no}) - 0.00127 * P_{no} + 0.518$
> 49 to ≤ 250 Watts	≥ 0.780	≥ 0.780
Note: All efficiency values shall be rounded to the hundredths place.		

Table 10: CoCPower Consumption Criteria for No-Load

Nameplate Output Power (P_{no})	Maximum Power in No-Load	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
≥ 0.3 to < 49 Watts	≤ 0.150 watts	≤ 0.075 watts
≥ 49 to < 250 Watts	≤ 0.250 watts	≤ 0.150 watts
Mobile handheld battery driven and < 8 W	≤ 0.075 watts	≤ 0.075 watts

Table 11 - Límite de eficiencia energética en modo activo y potencia en modo de no carga que deben cumplir las FAE

Clasificación según su nivel de tensión de salida	Tensión nominal de salida en c.c.	Con una Potencia de salida (P_o)	Nivel de Eficiencia	Límite mínimo de eficiencia energética en modo activo, mayor o igual que:	Límite máximo de potencia en modo de no carga menor o igual que:
Tensión de salida USB	5,0 V $\pm$ 0,25 V	Menor o igual que 1,0 W	V	$0,497 \times P_o + 0,087$	0,30
			VI	$0,517 \times P_o + 0,087$	0,10
		Mayor que 1,0 W y menor o igual que 49,0 W	V	$0,075 \times [L_n(P_o)] + 0,561$	0,30
			VI	$0,0834 \times [L_n(P_o)] - 0,0014 \times P_o + 0,609$	0,10
		Mayor que 49,0 W y menor o igual que 250,0 W	V	0,86	0,50
			VI	0,87	0,21
Baja tensión de salida	Menor a 6,0 V	Menor o igual que 1,0 W	V	$0,497 \times P_o + 0,087$	0,30
			VI	$0,517 \times P_o + 0,087$	0,10
		Mayor que 1,0 W y menor o igual que 49,0 W	V	$0,075 \times [L_n(P_o)] + 0,561$	0,30
			VI	$0,0834 \times [L_n(P_o)] - 0,0014 \times P_o + 0,609$	0,10
		Mayor que 49,0 W y menor o igual que 250,0 W	V	0,86	0,50
			VI	0,87	0,21
Tensión de salida genérica	Mayor o igual a 6,0 V	Menor o igual que 1,0 W	V	$0,480 \times P_o + 0,140$	0,30
			VI	$0,5 \times P_o + 0,16$	0,10
		Mayor que 1,0 W y menor o igual que 49,0 W	V	$0,0626 \times [L_n(P_o)] + 0,622$	0,30
			VI	$0,071 \times [L_n(P_o)] - 0,0014 \times P_o + 0,67$	0,10
		Mayor que 49,0 W y menor o igual que 250,0 W	V	0,87	0,50
			VI		
VI	0,88	0,21			

En donde:

 L_n : Logaritmo natural. El orden de las operaciones algebraicas requiere que el cálculo del logaritmo natural se realiza primero. P_o : Potencia de salida de la FAE

===== END OF DATASHEET PACKAGE. =====



ENERGY EFFICIENCY CERTIFICATION (EEC): Test Report - Cover Page

Customer Name: Mean Well Enterprises Co., Ltd.

Address: No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 24891 Taiwan

Brand Name(s):



Model Number(s): GST36B12, GST36E12, GST36U12

Product Category: External Power Supply

Representative (tested) Model: GST36B12

Model Differences: All models are identical except for model designation

The sample(s) tested is(are) compliant with the following applied standards/regulations:

NRCAN: Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II

US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609

US DoE: Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430

EU Directive for Energy-related Products ErP 2009/125/EC and Implementing Measure (IM) no. EC278/2009 for External Power Supply

Australian (Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014) and New Zealand (Minimum energy performance standards)

EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5

Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances

Test Location Name: MEAN WELL ENTERPRISES CO., LTD.

Test Location Address: 28 WUQUAN 3RD RD, WUGU DISTRICT, NEW TAIPEI, 24891 TAIWAN

Testing Performed Under: ☐ UL Lab ☐ Private Label
☒ CTDP/SMTL ☐ WMTL ☐ EPA 3rd Party

UL Project No.: 4786997669 BA3, 4788995393-c

Project Handler: Hans Chen

Reviewed by: Evy Chang / Jasmin Wang

Issued: 2015-11-30
(yyyy-mm-dd)

Revised: 2019-08-02
(yyyy-mm-dd)

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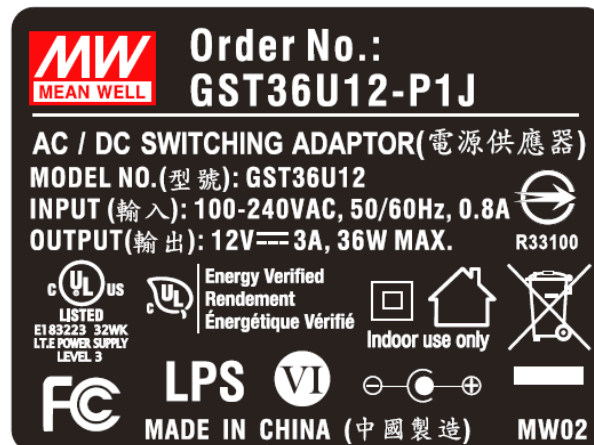


ATTACHMENT(S)

- Results Summary of International Efficiency Marking Protocol.
- Model(s) GST36B12, GST36E12, GST36U12 are Direct Operation, AC-DC, Basic-Voltage type EPS.

Test	Result	Compliant, Y/N
The roman numeral mark of International efficiency marking protocol, if applicable	VI	Yes

Label information:



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Annex A1

Regulatory Body	Test Method, Regulation or Program Evaluated to	Test Limit per Regulation or Program Requirement		Measurements		Other
		Average Efficiency In Active Mode	No-Load Mode Power	Average Efficiency In Active Mode	No-Load Mode Power	
NRCan	10 CFR Parts 429 and 430	≥ 87.4 %	≤ 0.1 W	89.39 %	0.0275 W	Complied
DoE	10 CFR Parts 429 and 430	≥ 87.4 %	≤ 0.1 W	89.39 %	0.0275 W	Level VI
CEC	Appliance Efficiency Regulations, Sections 1601 through 1609	≥ 87.4 %	≤ 0.1 W	89.39 %	0.0275 W	Complied
ErP	Annex I(b) Of 2009/125/EC and Commission Regulation (EC) No 278/2009	≥ 84.8 %	≤ 0.3 W	89.46 %	0.0339 W	Complied
Australian (GEMS) and New Zealand	AS/NZS4665.1-2005+A1:2009; AS/NZS4665.2-2005+A1:2009	≥ 84.6 %	≤ 0.3 W	89.46 %	0.0329 W	'High efficiency' performance mark V; Mark VI mentioned in the IEMP
CoC	Energy Efficiency of External Power Supplies Version 5	≥ 88.3 % ≥ 78.3 % @10% load	≤ 0.075 W	89.46 % 86.37 %	0.0339 W	Complied
Quebec	10 CFR Parts 429 and 430	≥ 87.4 %	≤ 0.1 W	89.39 %	0.0275 W	Complied

Additional Information:

See Energy Efficiency Laboratory Data Package of Project No: 4788995393-c for further details and test results.

N/A = Not Applicable

Project History:

For Project 4788995393-c:

- 1). Update regulations from NRCan: Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II to NRCan: Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II.
- 2). Update regulations from US CEC: Appliance Efficiency Regulations (California Code of Regulations, Title 20, Sections 1601 through 1608) dated July 2015 to US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609.
- 3). Update regulations from Australian (GEMS) and New Zealand : AS/NZS4665.1-2005+A1:2009 ; AS/NZS4665.2-2005+A1:2009 to Australian (Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014) and New Zealand (Minimum energy performance standards).

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- 4) Update regulations from EU Code of Conduct on Energy Efficiency of External Power Supplies, Version 5 to EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5.
- 5). Adding regulations Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances.
- 6). Update customer information from Mean Well Enterprises Co., Ltd., address No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 248 Taiwan to Mean Well Enterprises Co., Ltd., address No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 24891 Taiwan.

00-VS-F0417, Version 6.0 The information and documentation involving UL Mark services are provided on behalf of UL Verification Services Inc. or any authorized licensee of UL Verification Services Inc.. The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products.

DATA PACKAGE INFORMATION SHEET

Applicant Information	Name:		MEAN WELL ENTERPRISES CO., LTD.	
	Address:		No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 24891 Taiwan	
Product Information	Standard(s) or Regulation(s)	☒ US DoE: Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430		
		☒ US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609		
		☐ NRCan: Amendment 13 to the Energy Efficiency Regulations for External Power Supplies, in the Canada Gazette, Part II		
		☒ NRCan: Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II		
		☒ Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances		
		☒ Australian (Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014) and New Zealand (Minimum energy performance standards)		
		☒ EU Directive for Energy-related Products ErP 2009/125/EC and Implementing Measure (IM) no. EC278/2009 for External Power Supply		
		☒ EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5		
		☐ Mexico: NORMA Oficial Mexicana NOM-029-ENER-2017, Eficiencia energética de fuentes de alimentación externa. Límites, métodos de prueba, marcado y etiquetado.		
	☐ Other:			
	Test method(s)	☒ 10 CFR part 430, subpart B, Appendix Z "Uniform Test Method for Measuring the Energy Consumption of External Power Supplies"		
		☒ CAN/CSA-C381.1-08 Test method for calculating the energy efficiency of single-voltage external ac-dc and ac-ac power supplies		
		☒ CAN/CSA-C381.1-17 Test method for calculating the energy efficiency of single-voltage external ac-dc and ac-ac power supplies		
		☒ EN50563-2011/A1:2013, External a.c. - d.c. and a.c. - a.c. power supplies – Determination of no-load power and average efficiency of active modes		
		☒ EN50564-2011, Electrical and electronic household and office equipment - Measurement of low power consumption		
☒ "Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies" dated August 11, 2004				
☒ AS/NZS4665.1-2005+A1:2009; AS/NZS4665.2-2005+A1:2009				
☐ Other:				
Protocol		☒ International Efficiency Marking Protocol for External Power Supplies, Version 3.0		
CCNs:		ENVP		
Product Name/Type:		External Power Supply ☒ AC-DC ☐ AC-AC		
Model Number(s):		GST36B12, GST36E12, GST36U12		
Test Location Information	DAP and UL: ☒ CTD ☐ TCP ☐ TPTDP ☐ WTD ☐ UL			
	Test Location Name: MEAN WELL ENTERPRISES CO., LTD.			
	Test Location Address: 28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 24891 TAIWAN			
	Tests Conducted By**:		Print Frank Lin	
	**When all tests are conducted by one person, the printed name and signature can be inserted here instead of on each page containing data.			
	Authorized Signatory or TCP Reviewer:		Print Frank Lin	
			Date 2019-07-16	
	UL WTD Witness:		☐ UL Staff conducting or witnessing testing (WTD only)	
			☐ UL Staff supervising UL Staff in training	
			Print --	

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Special Instructions:

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

Standard	Ambient Temperature °C	Relative Humidity RH %	Supply Voltage Tolerance%	Total Harmonic Distortion THD %	Airspeed, room m/s	Supply Frequency Tolerance %
<u>the test method other than US DoE</u>	23±5	10-80 (For lab references)	±1	<2	≤0.5	±1
US DoE: 10 CFR Parts 429 and 430	20±5					

NOTE:

1. The input voltage source shall be capable of delivering at least 10 times the nameplate input power of the UUT (as is specified in IEEE 1515-2000).
2. Per chapter 4.2 in EN50564:2011, where the product has an ambient light sensor that affects the power consumption, the test shall be carried out with controlled ambient light conditions. Where the illuminance levels are externally defined (in a test procedure or in the instructions for use), these values shall be used. Where no illuminance levels are stated or defined, reference illuminance levels of more than 300 lux and less than 10 lux shall be used.

Witness Test Data Program (WTDP) Information:

Environment:	
Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025:2005 Clause 5.3.1, 5.3.2, 5.3.3, 5.3.4)	[] Yes [] No [] N/A
Personnel:	
Lab Management shall authorize personnel to operate particular types of equipment used in testing. (ISO/IEC 17025:2005 5.2.5)	[] Yes [] No
Equipment:	
Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025:2005 5.5.1, 5.5.2, 5.5.4, 5.5.5, 5.5.8,)	[] Yes [] No
Calibrations for testing equipment are traceable to SI Units. Refer to 00-OP-C0032 (Calibration Certificate Analysis). (ISO/IEC 17025:2005 5.6.2.2)	[] Yes [] No
Critical Consumables:	
Critical consumables are compliant with test standard requirements. (ISO/IEC 17025:2005 Clause 4.6)	[] Yes [] No [] N/A
Sample Identification:	CTDP program 2019-07-16 Frank Lin
Identification of items to be tested has been made (e.g. model no., Serial No., etc.) (See Test Sample Identification page and ISO/IEC 17025:2005 Clause 5.8.2)	[] Yes [] No
Additional Requirements:	
Testing at a third party laboratory selected by UL and not part of the Third Party Test Data Program requires a Mutual Nondisclosure (NDA) and Confidentiality Agreement, 00-LE-F0025, or alternate agreement form approved by UL's Legal Department to be stored and included with the Test Package.	[] Yes [] No [] N/A
Summary:	
The test facility was deemed to have the environment and capabilities necessary to perform the tests included in this data package.	[] Yes [] No

☐ The CAS Staff as indicated below, (a competent L1, L2 or L3 in a similar CCN/Standard for a similar test method) was utilized to conduct the witnessing of tests on behalf of the project handler. (Please complete the table below to document the rationale and approval.)

Name of UL Staff conducting WTDP	CCN/Standard to be witnessed	Test(s) to be witnessed	L1, L2 or L3 Competency	Similar CCN/Standard Competency

TEST SAMPLE IDENTIFICATION

The table below is to provide correlation of sample numbers to specific product related information. Refer to this table when a test identifies a test sample by "Sample No." only.

Sample Number	Sample Card Number	Date Received	Manufacturer, Product Identification and Ratings
19AA0716004	19AA	2019-07-16	MEAN WELL, External Power Supply Model GST36B12 I/P:100-240VAC, 50/60HZ, 0.8A; O/P:12Vdc, 3A
19AA0716005	19AA	2019-07-16	MEAN WELL, External Power Supply Model GST36B12 I/P:100-240VAC, 50/60HZ, 0.8A; O/P:12Vdc, 3A
19AA0716006	19AA	2019-07-16	MEAN WELL, External Power Supply Model GST36B12 I/P:100-240VAC, 50/60HZ, 0.8A; O/P:12Vdc, 3A
Sampling Procedure (if used) :		N/A	

TEST INSTRUMENTS REFERENCE LIST

Instr. Code	Instrument I.D.	Instrument Type	Range and/or Function Used ***	Make and Model **	Calibration Date	
					Last	Due
25	ACS002	Frequency Converter	47/50/60/120/120/240/450Hz	Chroma / 6530	2019-05-23	2020-05-22
26	Q887652	Anemometer	0.2 m/s	Lutron / AM-4214SD	2019-04-23	2020-04-22
27	15250924	Thermo-Hygrograph	10°C ~ +40°C 30%~80%RH	OMEGA / iTHX-SD	2019-05-27	2020-05-26
28	27DB37627	Digital power meter	15V~600V 1mA~20A	YOKOGAWA / WT-210	2019-05-04	2020-05-03
29	6314A003645	DC Electronic Load	1V~60V 40mA~60.12A	Chroma / 63103A	2019-05-15	2020-05-14
30	6314A003646	DC Electronic Load	1V~60V 40mA~60.14A	Chroma / 6314A+, 63103A	2019-05-15	2020-05-14
31	6314A003688	DC Electronic Load	1V~60V 0.4004A~60.19A	Chroma / 6314A+, 63103A	2019-05-15	2020-05-14
32	6314A003689	DC Electronic Load	1V~60V 40.5mA~60.14A	Chroma / 6314A+, 63103A	2019-05-15	2020-05-14

"Chamber setting(s) [] was [] were monitored to ensure that the setting(s) [] was [] were stable throughout the test time frame. Any deviations from the setting(s) are noted below.

Date	Test	Instrument Code	Time period of deviation	Setting(s)

** Information to be recorded when tests are conducted at a non-UL facility.

*** Refer to specific data sheet for individual scale used.

[] UL test equipment information is recorded on Meter Use in UL'S Aurora database.

POWER SUPPLY REFERENCE PAGE (ENGINEERING TO COMPLETE)

Product Name/Type:	External AC/DC Power Supply (EPS)	
Manufacturer:	MEAN WELL ENTERPRISES CO., LTD.	
Brand Name:		
Model Number/Designation:	GST36B12, GST36E12, GST36U12	
Model differences:	N/A	
Class A external power supply	☒ Yes ☐ No	
Adaptive external power supply	☐ Yes ☒ No	
Switch-selectable single voltage external power supply	☐ Yes ☒ No	
External Power Supply Product Class ID	☒ B	Direct Operation, AC-DC, Basic-Voltage
	☐ C	Direct Operation, AC-DC, Low-Voltage (except those with nameplate output voltage less than 3 volts and nameplate output current greater than or equal to 1,000 milliamps that charge the battery of a product that is fully or primarily motor operated)
	☐ D	Direct Operation, AC-AC, Basic-Voltage
	☐ E	Direct Operation, AC-AC, Low-Voltage
	☐ H	Direct Operation, High-Power
	☐ N	Indirect Operation

Nameplate Rating:	Input:	100-240VAC, 50/60HZ, 0.8A
	Output:	12Vdc, 3A, 36W Max.

Each sample was tested at:	☒ 115V, 60Hz ☒ 230V, 50Hz ☐ 240V, 50Hz ☐ 127V, 60Hz		
UUT Output Cord Length (± 1 cm):	100		
UUT is a Replacement EPS:	☐ Yes	☒ No	☐ N/A
Presence of Input Power Switch (Y/N):	☐ Yes	☒ No	
Input Power Switch (ON/OFF):	☐ ON	☐ OFF	☒ N/A
End Product Powered by the UUT:	N/A		

Notes/Comments:
☐ For Mexico EE - Las pruebas realizadas en 115/230 V ac se consideran representativas al 127/220 Vac. (Tests performed on 115/230 Vac were considered representative to 127/220 Vac.)

TECHNICIAN'S REFERENCE PAGE

DEFINITIONS

“UUT”: an acronym for “unit under test,” which in this case refers to the power supply sample being tested.

“Active mode”: A condition in which the input of a power supply is connected to the line voltage ac and the output is connected to an ac or dc load, drawing a fraction of the power supply's nameplate output power.

“Active mode efficiency”: The ratio which is expressed as a percentage, of the total active output power (ac or dc) produced by a power supply to the active input power (ac) required to produce the total active output power.

“Ambient temperature”: The temperature which is the air immediately surrounding the unit under test (UUT).

“Average Active-Mode Efficiency”: The average of the loading conditions (100%, 75%, 50%, and 25% of its nameplate output current) for which it can sustain the output current.

“Manual on-off switch”: a switch activated by the user to control power reaching the device. This term does not apply to any mechanical, optical, or electronic switches that automatically disconnect mains power from the device when a load is disconnected from the device, or that control power to the load itself.

“Power Factor (True), PF”: The true power factor is the ratio of the active or real power (P) consumed in watts to the apparent power (S), drawn in volt-amperes (VA).

“Crest Factor, CF”: The measured peak current drawn by the product divided by the measured r.m.s current drawn by the product.

“Nameplate output current”: The current output of the power supply as specified by the manufacturer on the label on the housing of the power supply, if absent from the housing, as provided by the manufacturer. This is also called rated output current. Alternatively, it is the nameplate output power divided by nameplate output voltage.

“Nameplate output power”: the power output of the power supply as specified on the manufacturer's label on the power supply housing or, if absent from the housing, as specified in documentation provided by the manufacturer, or calculated by multiplying the nameplate output voltage by the nameplate output current ($V \cdot A$).

“Nameplate Output Voltage”: The voltage output of the power supply as specified by the manufacturer on the label on the housing of the power supply (either dc or ac). This is also called rated output voltage.

“No load”: the mode of operation when an external power supply is connected to the main electricity supply and the output is not connected to a load.

Note: No-load modes include Standby mode and OFF mode.

“No-load power”: the wattage of active power (ac) consumed by a power supply operating in the no-load condition.

“Off mode”: the condition, applicable only to units with manual on-off switches, in which the external power supply is (1) connected to the main electricity supply; (2) the output is not connected to any load; and (3) all manual on-off switches are turned off.

“Basic-Voltage external power supply”: An external power supply is not a low-voltage external power supply.

“Low voltage external power supply”: An external power supply with a nameplate output voltage of less than 6 volts and a nameplate output current greater than or equal to 550 milliamperes.

“Direct Operation external power supply”: An external power supply can operate a consumer product that is not a battery charger without the assistance of a battery.

“Indirect Operation external power supply”: An external power supply cannot operate a consumer product that is not a battery charger without the assistance of a battery.

“Adaptive external power supply”: An external power supply that can alter its output voltage during active-mode based on an established digital communication protocol with the end-use application without any user-generated action.

TECHNICIAN'S REFERENCE PAGE (Cont'd)

“Switch-selectable single voltage external power supply”: A single-voltage AC-AC or AC-DC power supply that allows users to choose from more than one output voltage.

“Maximum Current Ratio (MCR)”: Crest Factor (CF)/Power Factor (PF)

POWER MEASUREMENT EQUIPMENT AND UNCERTAINTY

Any power measurements recorded, as well as any power measurement equipment utilized for testing, shall conform to the following:

Resolution and Uncertainty requirements are outlined in Section 4, “General conditions for measurements,” as well as Annexes B, “Notes on the measurement of low power modes,” and Annexes D, “Determination of uncertainty of measurement,” of IEC 62301:2011 (incorporated by reference; see §430.3) and EN50564:2011.

EFFICIENCY CALCULATION

Efficiency shall be calculated by dividing the UUT's measured active output power at a given load condition by the active ac input power measured at that load condition. Average efficiency shall also be calculated and reported as the arithmetic mean of the efficiency values calculated at Load Conditions 1, 2, 3, and 4 in Table 1. This is a simple arithmetic average of active mode efficiency values, and is not intended to represent weighted average efficiency, which would vary according to the duty cycle of the product powered by the UUT.

POWER CONSUMPTION CALCULATION

Power consumption of the UUT at each Load Condition 1 – 4 is the difference between the active output power (W) at that Load Condition and the ac active input power (W) at that Load Condition. The power consumption of Load Condition 5 (no load) is equal to the ac active input power (W) at that Load Condition.

TECHNICIAN'S REFERENCE PAGE (Cont'd)

General sampling requirements for selecting units to be tested. (10 CFR Part 429 Subpart B, 429.11)

(a) When testing of covered products or covered equipment is required to comply with section 323(c) of the Act, or to comply with rules prescribed under section 324, 325, or 342, 344, 345 or 346 of the Act, a sample comprised of production units (or units representative of production units) of the basic model being tested must be selected at random and tested, and must meet the criteria found in §§429.14 through 429.62 of this subpart. Components of similar design may be substituted without additional testing if the substitution does not affect energy or water consumption. Any represented values of measures of energy efficiency, water efficiency, energy consumption, or water consumption for all individual models represented by a given basic model must be the same, except for central air conditioners and central air conditioning heat pumps, as specified in §429.16 of this subpart.

(b) The minimum number of units tested shall be no less than two, except where:

(1) A different minimum limit is specified in §§429.14 through 429.65 of this subpart; or

(2) Only one unit of the basic model is produced, in which case, that unit must be tested and the test results must demonstrate that the basic model performs at or better than the applicable standard(s). If one or more units of the basic model are manufactured subsequently, compliance with the default sampling and representations provisions is required.

Sampling plan for External Power Supplies (10 CFR Part 429 Subpart B, 429.37)

(a) Sampling plan for selection of units for testing. (1) The requirements of §429.11 are applicable to external power supplies; and

(2) For each basic model of external power supply selected for testing, a sample of sufficient size shall be randomly selected and tested to ensure that—

(i) Any represented value of the estimated energy consumption of a basic model for which consumers would favor lower values shall be greater than or equal to the higher of:

(A) The mean of the sample, where:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i, \text{ and } \bar{x} \text{ is the sample mean; } n \text{ is the number of samples; and } x_i \text{ is the } i^{\text{th}} \text{ sample;}$$

Or,

(B) The upper 97.5 percent confidence limit (UCL) of the true mean divided by 1.05, where:

$$UCL = \bar{x} + t_{.975} \left(\frac{s}{\sqrt{n}} \right) \text{ And } \bar{x} \text{ is the sample mean; } s \text{ is the sample standard deviation; } n \text{ is the number of sample;}$$

and $t_{0.975}$ is the t statistic for a 97.5% one – tailed confidence interval with $n - 1$ degrees of freedom (from Appendix A).

and

(ii) Any represented value of the estimated energy consumption of a basic model for which consumers would favor higher values shall be less than or equal to the lower of:

(A) The mean of the sample, where:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i, \text{ and } \bar{x} \text{ is the sample mean; } n \text{ is the number of samples; and } x_i \text{ is the } i^{\text{th}} \text{ sample;}$$

Or,

(B) The lower 97.5 percent confidence limit (LCL) of the true mean divided by 0.95, where:

$$LCL = \bar{x} - t_{.975} \left(\frac{s}{\sqrt{n}} \right) \text{ And } \bar{x} \text{ is the sample mean; } s \text{ is the sample standard deviation; } n \text{ is the number of sample;}$$

and $t_{0.975}$ is the t statistic for a 97.5% one – tailed confidence interval with $n - 1$ degrees of freedom (from Appendix A).

TECHNICIAN'S REFERENCE PAGE (Cont'd)**Appendix A to Subpart B of Part 429—Student's t-Distribution Values for Certification Testing**

[One-Sided]

Degrees of freedom (from Appendix A)	Confidence Interval			
	90%	95%	97.5%	99%
1	3.078	6.314	12.71	31.82
2	1.886	2.920	4.303	6.965
3	1.638	2.353	3.182	4.541
4	1.533	2.132	2.776	3.747
5	1.476	2.015	2.571	3.365
6	1.440	1.943	2.447	3.143
7	1.415	1.895	2.365	2.998
8	1.397	1.860	2.306	2.896
9	1.383	1.833	2.262	2.821
10	1.372	1.812	2.228	2.764
11	1.363	1.796	2.201	2.718
12	1.356	1.782	2.179	2.681
13	1.350	1.771	2.160	2.650
14	1.345	1.761	2.145	2.624
15	1.341	1.753	2.131	2.602
16	1.337	1.746	2.120	2.583
17	1.333	1.740	2.110	2.567
18	1.330	1.734	2.101	2.552
19	1.328	1.729	2.093	2.539
20	1.325	1.725	2.086	2.528

TECHNICIAN'S REFERENCE PAGE (Cont'd)

INSTRUCTIONS – TEST PREPARATION AND LOADING

There shall be no intentional cooling of the UUT such as by use of separately powered fans, air conditioners, or heat sinks. The UUT shall be conditioned, rested, and tested on a thermally non-conductive surface. A readily available material such as Styrofoam will be sufficient.

Any built-in switch in the UUT controlling power flow to the AC input must be in the “on” position for this measurement.

Test power supplies packaged for consumer use to power a product with the DC output cord supplied by the manufacturer. There are two options for connecting metering equipment to the output of this type of power supply: Cut the cord immediately adjacent to the DC output connector, or attach leads and measure the efficiency from the output connector itself.

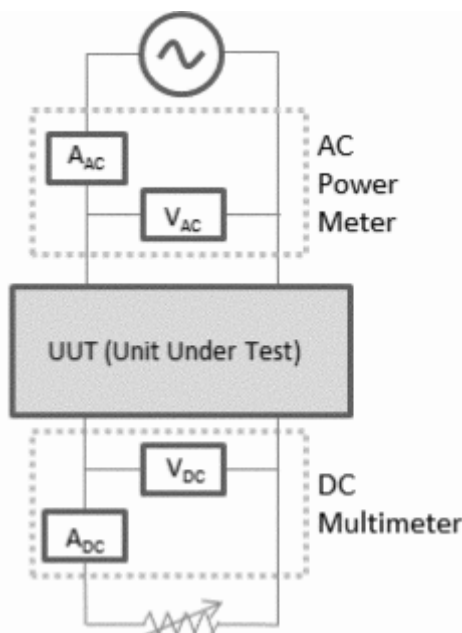
If the power supply is attached directly to the product that it is powering, cut the cord immediately adjacent to the powered product and connect DC measurement probes at that point. Any additional metering equipment such as voltmeters and/or ammeters used in conjunction with resistive or electronic loads must be connected directly to the end of the output cable of the UUT.

If the product has more than two output wires, including those that are necessary for controlling the product, the manufacturer must supply a connection diagram or test fixture that will allow the testing laboratory to put the unit under test into active-mode. Figure 1 provides one illustration of how to set up an EPS for test.

In order to load the power supply to produce all four active-mode load conditions, use a set of variable resistive or electronic loads. Although these loads may have different characteristics than the electronic loads power supplies are intended to power, they provide standardized and readily repeatable references for testing and product comparison.

Note that resistive loads need not be measured precisely with an ohmmeter; simply adjust a variable resistor to the point where the ammeter confirms that the desired percentage of nameplate output current is flowing. For electronic loads, adjust the desired output current in constant current (CC) mode rather than adjusting the required output power in constant power (CP) mode.

Figure 1 – Example connection diagram for EPS efficiency measurement.



ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:

TESTING SEQUENCE:

The UUT shall be tested at each load condition specified in Table 1, testing consecutively from Load Condition 1 to 5. The UUT shall be operated at 100% of nameplate current output (Load Condition 1) for at least 30 minutes immediately prior to conducting efficiency measurements.

For the agencies other than NRCan/Quebec, after this warm-up period, the technician shall monitor AC input power for a period of 5 minutes to assess the stability of the UUT. If the power level does not drift by more than 5% from the maximum value observed, the UUT can be considered stable and the measurements can be recorded at the end of the 5 minute period. Subsequent load conditions (see Table 1) can then be measured under the same 5 minute stability guidelines. Note that only one warm-up period of 30 minutes is required for each UUT at the beginning of the test procedure.

If AC input power is not stable over a 5 minute period, the technician shall follow the guidelines established by IEC 62301⁽¹⁾ for measuring average power or accumulated energy over time for both ac input and dc output. Specifically in EU Directive for ErP, the stability shall be determined in accordance with EN 50564:2011, 5.3.

Efficiency measurements shall be conducted in sequence from Load Condition 1 to Load Condition 5 as indicated in Table 1. If testing of additional, optional load conditions is desired, that testing should be conducted in accordance with this test procedure and subsequent to completing the sequence described above.

For NRCan/Quebec, the regulations will provide this flexibility by allowing external power supplies to be tested to either the Canadian test standard (CAN/CSA C381.1) or the U.S. test procedure Appendix Z (the agencies other than NRCan/Quebec). If follow Canadian test standard, the UUT shall be operated for 30 minutes at each load condition prior to measurement. The input and output power shall be measured using the Accumulated Energy Approach specified in CAN/CSA 62301 clause 5.3.2b) for at least 5 minutes. No load power shall be recorded for Load Condition 5.

NOTE: To ensure consistent unit, it is recommended that watt-hours and hours be used above, to give watts.

For Australia/New Zealand requirements, if the power supply nameplate input voltage is 240V only, conduct the testing at 240V ac, 50Hz and record in the 230V ac tables for ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST. The testing voltage, 240V ac, 50 Hz shall be recorded.

The above testing sequence shall be repeated on three UUT in total of the same model.

Test switch-selectable single-voltage external power supplies twice, once at the highest nameplate output voltage and once at the lowest.

Test adaptive external power supplies twice, once at the highest achievable output voltage and once at the lowest.

⁽¹⁾Same as AS/NZS 62301.

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)**Table 1 – Load Conditions**

Load Conditions for UUT	Percentage of Nameplate Output Current
1	100% $\pm$ 2% ⁽²⁾
2	75% $\pm$ 2%
3	50% $\pm$ 2%
4	25% $\pm$ 2%
5	0%
Note(s): 1. ⁽²⁾ The 2% allowance is of nameplate output current, not of the calculated current value. 2. For example, a UUT at Load Condition 3 may be tested in a range from 48% (min) to 52% (max) of rated output current. 3. It is mandatory for CoC. The UUT shall be considered 10% $\pm$ 2% of nameplate output current after load condition 4, warm up period is 0 minute and 5 minutes is for assessment period, and then continue load condition 5.	

Comments:

1. If instantaneous power measurement is acceptable, technician record the instantaneous power measurement under the column “Avg. Power (W)” and then shall fill cells of columns “Wh” and “Wh Interval” with “-” or leave them “blank.”
2. If accumulated energy approach used, the average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes).

Tested by: Frank Lin

Tested by: Frank Lin

Test date: 2019-07-16

signature

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Sample #: 19AA0716004

Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,**ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)**

RESULTS FOR SAMPLE 1 under CAN/CSA-C381.1-08 Test method for calculating the energy efficiency of single-voltage external ac-dc and ac-ac power supplies

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s): <0.2
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.

External Power Supply Input Electric Data										External Power Supply Output Electric Data			
Load	V	Hz	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	114.77	60.00	0.645	0.5571	3.76700	0.23	3.4229	41.0754	5.00	12.10	3.00	3.0320	36.3840
2 (75%)	114.79	60.00	0.503	0.5311	3.84900	0.20	2.5515	30.6176	5.00	12.13	2.25	2.2785	27.3421
3 (50%)	114.83	60.00	0.358	0.4961	3.97800	0.17	1.7025	20.4306	5.00	12.15	1.50	1.5226	18.2716
4 (25%)	114.85	60.00	0.199	0.4486	4.28600	0.14	0.8460	10.1523	5.00	12.17	0.75	0.7624	9.1483
Optional (10%)	114.86	60.00	0.089	0.3972	4.64400	0.12	0.3405	4.0865	5.00	12.19	0.30	0.3057	3.6686
5 (0%)	114.88	60.00	0.013	0.0181	2.38300	0.12	0.0043	0.0260	10.00				

				Power Measurement Uncertainty Calculation and Judgement						
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.80	Accumulated Energy	--	6.762	0.334072	--	Complied	--	--	--
2 (75%)	0.62	Accumulated Energy	--	7.247	0.293620	--	Complied	--	--	--
3 (50%)	0.15	Accumulated Energy	--	8.019	0.177160	--	Complied	--	--	--
4 (25%)	1.63	Accumulated Energy	--	9.554	0.093181	--	Complied	--	--	--
Optional (10%)	0.07	Accumulated Energy	--	11.692	0.040014	0.022707	--	--	Complied	--
5 (0%)	12.27	Sampling	-12.61E-9	131.657	0.006666	0.214651	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
4.6914	3.2755	2.159	1.004	0.4179	0.026

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 ~ 4
88.57857	89.3019	89.4325	90.1106	89.7736	89.35590082

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin

Tested by: Frank Lin

Test date: 2019-07-16

signature

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Sample #: 19AA0716005

Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,**ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)**

RESULTS FOR SAMPLE 2 under CAN/CSA-C381.1-08 Test method for calculating the energy efficiency of single-voltage external ac-dc and ac-ac power supplies

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s): <0.2

Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.

Load	External Power Supply Input Electric Data									External Power Supply Output Electric Data			
	V	HZ	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	114.77	60.00	0.640	0.5583	3.47600	0.19	3.4230	41.0762	5.00	12.12	3.00	3.0353	36.4236
2 (75%)	114.80	60.00	0.499	0.5338	3.67700	0.16	2.5514	30.6163	5.00	12.15	2.25	2.2809	27.3707
3 (50%)	114.83	60.00	0.355	0.5001	3.92700	0.15	1.7027	20.4322	5.00	12.17	1.50	1.5234	18.2810
4 (25%)	114.85	60.00	0.198	0.4476	4.28700	0.13	0.8487	10.1843	5.00	12.19	0.75	0.7639	9.1669
Optional (10%)	114.87	60.00	0.090	0.3966	4.64900	0.12	0.3411	4.0935	5.00	12.20	0.30	0.3063	3.6752
5 (0%)	114.88	60.00	0.013	0.0182	2.40600	0.13	0.0044	0.0265	10.00				

				Power Measurement Uncertainty Calculation and Judgement						
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.02	Accumulated Energy	--	6.226	0.333694	--	Complied	--	--	--
2 (75%)	0.39	Accumulated Energy	--	6.888	0.217925	--	Complied	--	--	--
3 (50%)	0.07	Accumulated Energy	--	7.852	0.176408	--	Complied	--	--	--
4 (25%)	0.11	Accumulated Energy	--	9.578	0.093469	--	Complied	--	--	--
Optional (10%)	0.12	Accumulated Energy	--	11.722	0.040090	0.022755	--	--	Complied	--
5 (0%)	8.66	Sampling	-47.73E-9	132.198	0.006704	0.215517	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
4.6526	3.2456	2.1512	1.0174	0.4183	0.0265

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 - 4
88.67325	89.3991	89.4715	90.0101	89.7814	89.38849782

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin

Tested by: Frank Lin

Test date: 2019-07-16

signature

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Sample #: 19AA0716006

Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,**ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)**

RESULTS FOR SAMPLE 3 under CAN/CSA-C381.1-08 Test method for calculating the energy efficiency of single-voltage external ac-dc and ac-ac power supplies

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s): <0.2

Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.

Load	External Power Supply Input Electric Data									External Power Supply Output Electric Data			
	V	HZ	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	114.77	60.00	0.636	0.5594	3.42400	0.19	3.4055	40.8664	5.00	12.06	3.00	3.0169	36.2026
2 (75%)	114.80	60.00	0.496	0.5347	3.67200	0.16	2.5390	30.4675	5.00	12.09	2.25	2.2681	27.2173
3 (50%)	114.83	60.00	0.353	0.5009	3.95200	0.14	1.6935	20.3223	5.00	12.12	1.50	1.5144	18.1734
4 (25%)	114.86	60.00	0.196	0.4491	4.31200	0.13	0.8443	10.1313	5.00	12.14	0.75	0.7584	9.1005
Optional (10%)	114.87	60.00	0.089	0.3964	4.63900	0.12	0.3393	4.0712	5.00	12.15	0.30	0.3021	3.6256
5 (0%)	114.87	60.00	0.013	0.0172	2.40100	0.13	0.0041	0.0246	10.00				

				Power Measurement Uncertainty Calculation and Judgement						
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.37	Accumulated Energy	--	6.121	0.332408	--	Complied	--	--	--
2 (75%)	0.03	Accumulated Energy	--	6.867	0.217003	--	Complied	--	--	--
3 (50%)	0.07	Accumulated Energy	--	7.890	0.175713	--	Complied	--	--	--
4 (25%)	1.47	Accumulated Energy	--	9.601	0.093009	--	Complied	--	--	--
Optional (10%)	0.17	Accumulated Energy	--	11.703	0.039965	0.022725	--	--	Complied	--
5 (0%)	11.78	Sampling	-31.09E-9	139.593	0.006653	0.227349	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
4.6638	3.2502	2.1489	1.0308	0.4456	0.0246

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 - 4
88.58769	89.3322	89.4259	89.8256	89.0548	89.2928537

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin
signatureTested by: Frank Lin
print

Test date: 2019-07-16

Sample #: 19AA0716004

Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,**ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)**

RESULTS FOR SAMPLE 1 under test method other than CAN/CSA-C381.1-08, NOM-029

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s): <0.2

Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.

Load	External Power Supply Input Electric Data									External Power Supply Output Electric Data			
	V	HZ	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	114.71	60.00	0.642	0.5577	3.68300	0.25	3.4205	41.0454	5.00	12.11	3.00	3.0320	36.3837
2 (75%)	114.75	60.00	0.501	0.5340	3.78100	0.23	2.5494	30.5927	5.00	12.13	2.25	2.2785	27.3415
3 (50%)	114.79	60.00	0.357	0.4977	3.96300	0.20	1.7000	20.3996	5.00	12.15	1.50	1.5225	18.2700
4 (25%)	114.80	60.00	0.195	0.4527	4.18500	0.17	0.8433	10.1196	5.00	12.17	0.75	0.7622	9.1464
Optional (10%)	114.86	60.00	0.089	0.3972	4.64400	0.13	0.3394	4.0726	5.00	12.19	0.30	0.3058	3.6696
5 (0%)	114.88	60.00	0.013	0.0199	2.38900	0.13	0.0044	0.0263	10.00				

				Power Measurement Uncertainty Calculation and Judgement						
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.05	Accumulated Energy	--	6.604	0.333746	--	Complied	--	--	--
2 (75%)	0.23	Accumulated Energy	--	7.081	0.292764	--	Complied	--	--	--
3 (50%)	0.05	Accumulated Energy	--	7.963	0.176701	--	Complied	--	--	--
4 (25%)	0.68	Accumulated Energy	--	9.245	0.092544	--	Complied	--	--	--
Optional (10%)	0.15	Accumulated Energy	--	11.692	0.039928	0.022707	--	--	Complied	--
5 (0%)	26.96	Sampling	34.13E-9	120.050	0.006437	0.196080	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
4.6617	3.2512	2.1296	0.9732	0.403	0.0263

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 - 4
88.64258	89.3726	89.5606	90.383	90.1046	89.48970077

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin

Tested by: Frank Lin

Test date: 2019-07-16

signature

print

Sample #: 19AA0716005

Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,**ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)**

RESULTS FOR SAMPLE 2 under test method other than CAN/CSA-C381.1-08, NOM-029

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s): <0.2

Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.

External Power Supply Input Electric Data										External Power Supply Output Electric Data			
Load	V	Hz	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	114.69	60.00	0.636	0.5631	3.38900	0.24	3.4218	41.0611	5.00	12.12	3.00	3.0351	36.4215
2 (75%)	114.76	60.00	0.497	0.5382	3.67800	0.19	2.5507	30.6078	5.00	12.14	2.25	2.2809	27.3710
3 (50%)	114.78	60.00	0.353	0.5054	3.94400	0.17	1.7007	20.4079	5.00	12.16	1.50	1.5233	18.2792
4 (25%)	114.81	60.00	0.195	0.4607	4.25500	0.19	0.8479	10.1742	5.00	12.19	0.75	0.7637	9.1647
Optional (10%)	114.86	60.00	0.089	0.3972	4.63800	0.12	0.3403	4.0839	5.00	12.20	0.30	0.3062	3.6745
5 (0%)	114.87	60.00	0.013	0.0184	2.39400	0.13	0.0045	0.0267	10.00				

				Power Measurement Uncertainty Calculation and Judgement						
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.15	Accumulated Energy	--	6.018	0.332112	--	Complied	--	--	--
2 (75%)	0.26	Accumulated Energy	--	6.834	0.216775	--	Complied	--	--	--
3 (50%)	0.31	Accumulated Energy	--	7.804	0.175298	--	Complied	--	--	--
4 (25%)	0.68	Accumulated Energy	--	9.236	0.091963	--	Complied	--	--	--
Optional (10%)	0.10	Accumulated Energy	--	11.677	0.039997	0.022683	--	--	Complied	--
5 (0%)	9.69	Sampling	-7.73E-9	130.109	0.006700	0.212174	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
4.6396	3.2368	2.1287	1.0095	0.4094	0.0267

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 ~ 4
88.70074	89.4249	89.5692	90.0778	89.9753	89.44318458

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin
signatureTested by: Frank Lin
print

Test date: 2019-07-16

Sample #: 19AA0716006

Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,**ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)**

RESULTS FOR SAMPLE 3 under test method other than CAN/CSA-C381.1-08, NOM-029

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s): <0.2

Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.

External Power Supply Input Electric Data										External Power Supply Output Electric Data			
Load	V	Hz	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	114.69	60.00	0.632	0.5643	3.42200	0.23	3.4048	40.8571	5.00	12.06	3.00	3.0170	36.2034
2 (75%)	114.76	60.00	0.493	0.5377	3.69300	0.19	2.5368	30.4410	5.00	12.08	2.25	2.2677	27.2128
3 (50%)	114.78	60.00	0.349	0.5070	3.95400	0.18	1.6915	20.2978	5.00	12.11	1.50	1.5141	18.1692
4 (25%)	114.82	60.00	0.194	0.4525	4.36700	0.15	0.8418	10.1013	5.00	12.14	0.75	0.7580	9.0954
Optional (10%)	114.86	60.00	0.089	0.3953	4.66200	0.13	0.3384	4.0608	5.00	12.15	0.30	0.3018	3.6221
5 (0%)	114.88	60.00	0.013	0.0175	2.41500	0.13	0.0041	0.0247	10.00				

				Power Measurement Uncertainty Calculation and Judgement						
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.25	Accumulated Energy	--	6.064	0.330833	--	Complied	--	--	--
2 (75%)	0.10	Accumulated Energy	--	6.868	0.216127	--	Complied	--	--	--
3 (50%)	0.37	Accumulated Energy	--	7.799	0.174463	--	Complied	--	--	--
4 (25%)	0.32	Accumulated Energy	--	9.651	0.092466	--	Complied	--	--	--
Optional (10%)	0.07	Accumulated Energy	--	11.794	0.039963	0.022870	--	--	Complied	--
5 (0%)	9.63	Sampling	-32.76E-9	138.000	0.006617	0.224800	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
4.6537	3.2282	2.1286	1.0059	0.4387	0.0247

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 ~ 4
88.60981	89.3952	89.5131	90.0419	89.1967	89.39001545

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin

Tested by: Frank Lin

Test date: 2019-07-16

signature

print

Sample #: 19AA0716004

Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,**ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)**

RESULTS FOR SAMPLE 1 under test method other than CAN/CSA-C381.1-08, NOM-029

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s): <0.2

Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 3.

External Power Supply Input Electric Data										External Power Supply Output Electric Data			
Load	V	Hz	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	229.78	50.00	0.425	0.4181	4.98800	0.25	3.3938	40.7261	5.00	12.10	3.00	3.0321	36.3856
2 (75%)	229.78	50.00	0.335	0.3989	5.16900	0.23	2.5559	30.6703	5.00	12.13	2.25	2.2788	27.3454
3 (50%)	229.82	50.00	0.229	0.3839	5.21000	0.21	1.6888	20.2660	5.00	12.15	1.50	1.5226	18.2709
4 (25%)	229.83	50.00	0.120	0.3688	5.01600	0.18	0.8510	10.2117	5.00	12.18	0.75	0.7624	9.1483
Optional (10%)	229.84	50.00	0.058	0.3157	5.57800	0.15	0.3500	4.1999	5.00	12.19	0.30	0.3058	3.6698
5 (0%)	229.85	50.00	0.019	0.0081	2.01300	0.15	0.0028	0.0339	5.00				

Power Measurement Uncertainty Calculation and Judgement										
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.17	Accumulated Energy	--	11.930	0.388059	0.023088	--	--	Complied	--
2 (75%)	0.10	Accumulated Energy	--	12.958	0.337016	0.024733	--	--	Complied	--
3 (50%)	0.10	Accumulated Energy	--	13.571	0.202889	0.025714	--	--	Complied	--
4 (25%)	0.09	Accumulated Energy	--	13.601	0.141792	0.025762	--	--	Complied	--
Optional (10%)	0.07	Accumulated Energy	--	17.669	0.061546	0.032270	--	--	Complied	--
5 (0%)	2.95	Accumulated Energy	--	248.519	0.015933	0.401630	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
4.3405	3.3249	1.9951	1.0634	0.5301	0.0339

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 ~ 4
89.342215	89.15922	90.15543	89.58645	87.37827	89.56083053

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin

Tested by: Frank Lin

Test date: 2019-07-16

signature

print

Sample #: 19AA0716005

Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,**ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)**

RESULTS FOR SAMPLE 2 under test method other than CAN/CSA-C381.1-08, NOM-029

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s): <0.2

Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 3.

External Power Supply Input Electric Data										External Power Supply Output Electric Data			
Load	V	HZ	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	229.77	50.00	0.413	0.4293	4.68100	0.23	3.3919	40.7030	5.00	12.13	3.00	3.0355	36.4260
2 (75%)	229.80	50.00	0.322	0.4131	4.74700	0.21	2.5540	30.6477	5.00	12.15	2.25	2.2811	27.3731
3 (50%)	229.82	50.00	0.223	0.3982	4.71800	0.18	1.6989	20.3864	5.00	12.17	1.50	1.5232	18.2788
4 (25%)	229.84	50.00	0.120	0.3710	4.88800	0.16	0.8516	10.2193	5.00	12.18	0.75	0.7637	9.1647
Optional (10%)	229.84	50.00	0.059	0.3093	5.67900	0.15	0.3508	4.2092	5.00	12.20	0.30	0.3061	3.6734
5 (0%)	229.84	50.00	0.018	0.0081	2.02400	0.15	0.0028	0.0334	5.00				

				Power Measurement Uncertainty Calculation and Judgement						
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.10	Accumlated Energy	--	10.904	0.382317	0.021446	--	--	Complied	--
2 (75%)	0.03	Accumlated Energy	--	11.491	0.331098	0.022386	--	--	Complied	--
3 (50%)	0.10	Accumlated Energy	--	11.848	0.199505	0.022957	--	--	Complied	--
4 (25%)	0.03	Accumlated Energy	--	13.175	0.141488	0.025080	--	--	Complied	--
Optional (10%)	0.07	Accumlated Energy	--	18.361	0.062197	0.033378	--	--	Complied	--
5 (0%)	3.00	Accumlated Energy	--	249.877	0.015799	0.403803	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
4.277	3.2746	2.1076	1.0546	0.5358	0.0334

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 ~ 4
89.492175	89.31535	89.66174	89.68031	87.27074	89.53739234

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

Tested by: Frank Lin

Tested by: Frank Lin

Test date: 2019-07-16

signature

print

Sample #: 19AA0716006

Instrument Code / Range: #25,50/60Hz, #26,0.2m/s, #28,Max.80V,60A,
#29,Max.80V,60A, #30,Max.80V,60A,
#31,Max.80V,60A, #32,Max.80V,60A,**ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)**

RESULTS FOR SAMPLE 3 under test method other than CAN/CSA-C381.1-08, NOM-029

Ambient Temperature (°C): 25 Relative Humidity (%): 55 Airspeed, room (m/s): <0.2

Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 60 Rated Output Current (A): 3.

External Power Supply Input Electric Data										External Power Supply Output Electric Data			
Load	V	Hz	A	PF	CF	THD	Wh	Avg. Power (W) (Pm)	Wh Interval [min]	V	A	Wh	Avg. Power (W)
1 (100%)	229.77	50.00	0.404	0.4376	4.47800	0.23	3.3753	40.5036	5.00	12.06	3.00	3.0176	36.2116
2 (75%)	229.81	50.00	0.311	0.4261	4.29300	0.21	2.5409	30.4907	5.00	12.09	2.25	2.2682	27.2184
3 (50%)	229.82	50.00	0.215	0.4089	4.79500	0.17	1.6885	20.2618	5.00	12.11	1.50	1.5143	18.1718
4 (25%)	229.84	50.00	0.118	0.3746	4.84800	0.15	0.8469	10.1633	5.00	12.14	0.75	0.7582	9.0980
Optional (10%)	229.83	50.00	0.060	0.3043	5.77400	0.14	0.3498	4.1972	5.00	12.15	0.30	0.3021	3.6254
5 (0%)	229.82	50.00	0.018	0.0081	2.02400	0.15	0.0027	0.0329	5.00				

Power Measurement Uncertainty Calculation and Judgement										
Load	Stability Assessment %	*Measurement method used	Slope value (mW/h)	Maximum Current Ratio (MCR)	** Ue	*** Upc	MCR ≤ 10 and Pm ≥ 1 W, Umr ≤ 2%*Pm	MCR ≤ 10 and Pm < 1 W, Uma ≤ 0.02W	MCR > 10 and Pm ≥ 1 W, Ue ≤ Upc	MCR > 10 and Pm < 1 W, Ue ≤ MAX(0.02W or Upc*Pm)
1 (100%)	0.07	Accumulated Energy	--	10.233	0.377207	0.020373	--	--	Complied	--
2 (75%)	0.07	Accumulated Energy	--	10.075	0.325209	0.020120	--	--	Complied	--
3 (50%)	0.15	Accumulated Energy	--	11.727	0.195833	0.022763	--	--	Complied	--
4 (25%)	0.07	Accumulated Energy	--	12.942	0.140556	0.024707	--	--	Complied	--
Optional (10%)	0.07	Accumulated Energy	--	18.975	0.062573	0.034360	--	--	Complied	--
5 (0%)	3.65	Accumulated Energy	--	249.877	0.015684	0.403803	--	--	--	Complied

Power Consumed by UUT (W)					
100%	75%	50%	25%	10%	No Load
4.292	3.2723	2.09	1.0653	0.5718	0.0329

Efficiency of Power Supply (after 5 min warm-up)					
100%	75%	50%	25%	10%	Arithmetic Average of Efficiency at load 1 ~ 4
89.403411	89.26788	89.68502	89.51817	86.37663	89.46861938

* The measurement methods are defined in 5.3.2 or 5.3.3 of the standards, EN 50564:2011 and IEC62301:2011.

** Ue is the uncertainty relating to the measuring instrument.

*** Upc is the maximum permitted relative uncertainty for cases where the MCR is > 10.

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00-VS-F0861 - ISSUE 10.0

Tested by: Frank Lin Tested by: Frank Lin Test date: 2019-07-16
signature print
Sample # : 19AA0716004 , Instrument Code / Range:
19AA0716005 ,
19AA0716006

DURABILITY OF MARKING TEST for NOM-029-ENER-2017

METHOD

A sample of the marking label was subjected to this test. The surface of each marking as noted below was rubbed by hand for a period of 15 seconds with a water soaked cloth.

RESULTS

TEST OBSERVATIONS:	
	Water
Any Damage?	
Legible?	
Curled?	
Edge Lifted?	
Easily Removed Intact?	

The marking [was] [was not] durable and legible. The label [was] [was not] easily removed and [did] [did not] show curling.

Comments:

WORKSHEETS

The measured is the following:

[X] International Efficiency Marking Protocol (IEMP) for External Power Supplies: (at 115/230V ac, 60/50 Hz)

	Efficiency (%):	Sample No.:
Minimum Average Efficiency in ActiveMode	89.39	19AA0716006
Maximum Power In No-Load Condition	0.0339	19AA0716004
Base on Table 2, this EPS is complied with the requirements for level: <u>VI</u> at 115V ac; level: <u>VI</u> at 230V ac; The calculated Minimum Average Efficiency in Active Mode is: <u>0.874</u> (87.4 %) at 115V ac; <u>0.874</u> (87.4 %) at 230V ac and Maximum Energy Consumption in No-Load Mode is not greater than <u>0.100</u>Watt at 115V ac; <u>0.100</u>Watt at 230V ac. [] The true power factor was 0.9 or greater at 100% of rated load when tested at 115V, 60Hz. This requirement applies only to Level V power supplies with input power greater than or equal to 100W at 115V, 60Hz.		

[X]Canada NRCan/Quebec and US CEC requirements for external power supply: (at115V ac, 60 Hz)

CAN/CSA-C381.1-08	Efficiency (%):	Sample No.:
Minimum Average Efficiency in Active Mode	--	--
Maximum Power In No-Load Condition	--	--
10 CFR Appendix Z to Subpart B of Part 430	Efficiency (%):	Sample No.:
Minimum Average Efficiency in Active Mode	89.39	19AA0716006
Maximum Power In No-Load Condition	0.0267	19AA0716005
Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is:<u>0.874</u>(87.4%), and Maximum Energy Consumption in No-Load Mode is not greater than <u>0.1</u> Watt. This comply with requirements in: [] Amendment 13 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II [X] Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances		

WORKSHEETS (CONT'D)**[X] US DoE Requirements for external power supply: (at 115V ac, 60Hz)****The sampling plan calculation following 10CFR 429.1 and 429.37**

	Sample mean	*LCL/0.95	The lower of sample mean or LCL/0.95
Active mode	0.894	0.940	0.894
	Sample mean	**UCL/1.05	The higher of sample mean or UCL/1.05
No load mode	0.0259	0.0272	0.0272

* the lower 97.5 percent confidence limit (LCL) of the true mean divided by 0.95

** the upper 97.5 percent confidence limit (UCL) of the true mean divided by 1.05

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is: 0.874 (87.4%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.100Watt.

Any represented value of the estimated energy consumption of a basic model in Active Mode could be certified in the following range.

Based on Table 2, the calculated Minimum Average Efficiency		The represented value [declared by manufacturer]		Based on sampling plan, the higher of sample mean or LCL/0.95
0.874	≤	0.8939	≤	0.894

Any represented value of the estimated energy consumption of a basic model in No-Load condition could be certified in the following range.

Based on sampling plan, the lower of sample mean or UCL/1.05		The represented value [declared by manufacturer]		Based on table 2, the Maximum Energy Consumption
0.0272	≤	0.0275	≤	0.100

This comply with requirements in:

[X] Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430

[X] California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609

[X] Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II

[] Others: _____

[] MEXICO : NORMA Official Mexicana NOM-029-ENER-2017: (at 127V ac, 60 Hz)

	Efficiency (%):	Sample No.:
Minimum Average Efficiency in Active Mode	--	--
Maximum Power In No-Load Condition	--	--

Base on Table 11, the calculated Minimum Average Efficiency in Active Mode is: _____ (_____%), and Maximum Energy Consumption in No-Load Mode is not greater than _____ Watt.

This with requirements for **NOM-029-ENER-2017, Eficiencia energética de fuentes de alimentación externa. Límites, métodos de prueba, marcado y etiquetado.**

WORKSHEETS (CONT'D)

☒ **Australian GEMS and New Zealand MEPS: (at 230V ac or 240V ac, 50Hz)**

☒ **European Union (EU) Energy-related Products (ErP): (at 230V ac, 50Hz)**

☒ **European Union (EU) Code of Conduct: (at 230V ac, 50Hz)**

☐ **Others:** _____

Input Voltage(V ac): 230V ac, 50 Hz	Efficiency (%):	Sample No.:
Minimum Average Efficiency in ActiveMode	89.46	19AA0716006
Minimum 10% Load Average Efficiency in Active Mode	86.37	19AA0716006
Maximum Power In No-Load Condition	0.0339	19AA0716004
[] Input Voltage(V ac): 240 V ac, 50 Hz	Efficiency (%):	Sample No.:
Minimum Average Efficiency in ActiveMode	--	--
Maximum Power In No-Load Condition	--	--

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is: 0.846 (84.6%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.300 Watt.

This[comply] ~~[does not comply]~~ with performance mark [III] ; [IV] ; [V] requirements in:

Australian Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014 and New Zealand Energy Efficiency (Energy Using Products) Regulations 2002

Note:

For **Australian**, according to Clause 8(1)(b) in Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014, if a product exceeds the energy performance requirements for Mark V as mentioned in Appendix A of AS/NZS 4665.1:2005 and meets the performance requirements for Mark VI mentioned in the IEMP then the product may be labelled in accordance with the requirements for:

(i) Mark V mentioned in Appendix A of AS/NZS 4665.1:2005 and sections 4.2 and 5 of AS/NZS 4665.2:2005 (Energy Performance Mark); or (ii) Mark VI mentioned in the IEMP.

Base on Table 3, 4 and 5, the calculated Minimum Average Efficiency in Active Mode is: 0.848 (84.8%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.3 Watt.

This[comply] ~~[does not comply]~~ with requirements for **EU Directive for Energy-related Products 2009/125/EC and Implementing Measure no. EC 278/2009 for External Power Supply.**

Base on Table 6, 7, 8, 9, and 10, the calculated Minimum Average Efficiency in Active Mode is: 0.883 (88.3%), at 10% Load is: 0.783 (78.3%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.075 Watt.

This[comply] ~~[does not comply]~~ with requirements for **Code of Conduct on Energy Efficiency of External Power Supplies, Version 5.**

Table 2: International Efficiency Marking Protocol for External Power Supplies, Version 3.0

Mark	Performance Requirements				
	Nameplate Output Power (P _{no}) ²	No-Load Mode Power ³	Nameplate Output Power (P _{no})	Average Efficiency in Active Mode ⁴	Power Factor
I	Used if none of the other criteria are met.				
II	0 to ≤ 10 W	≤ 0.75	0 to < 1 W	≥ 0.39 * P _{no}	Not Applicable
	> 10 to 250 W	≤ 1.0	1 to < 49 W	≥ 0.107 * ln(P _{no}) + 0.39	
			> 49 W	≥ 0.82	
III	0 to < 10 W	≤ 0.5	0 to 1 W	≥ 0.49 * P _{no}	Not Applicable
	10 to 250 W	≤ 0.75	> 1 to 49 W	≥ 0.09 * ln(P _{no}) + 0.49	
			> 49 to 250 W	≥ 0.84	
IV	0 to 250 W	≤ 0.5	0 to < 1 W	≥ 0.5 * P _{no}	Not Applicable
			1 to 51 W	≥ 0.09 * ln(P _{no}) + 0.5	
			> 51 to 250 W	≥ 0.85	
V	0 to < 50 W	AC-DC: ≤ 0.3 AC-AC: ≤ 0.5	0 to ≤ 1 W	Basic Voltage: ≥ 0.480 * P _{no} + 0.140 Low Voltage ⁵ : ≥ 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.
	≥ 50 to ≤ 250 W	≤ 0.5	> 1 to ≤ 49 W	Basic Voltage: ≥ 0.0626 * ln(P _{no}) + 0.622 Low Voltage: ≥ 0.0750 * ln(P _{no}) + 0.561	
			> 49 to 250 W	Basic Voltage: ≥ 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 P_{no} 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.

Table 3: ErPEnergy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Standard Models

Nameplate Output Power (P_o)	Minimum Average Efficiency in Active Mode (expressed as a decimal)
0 to ≤ 1 Watt	$\geq 0.480 * P_o + 0.140$
> 1 to ≤ 51 Watts	$\geq [0.063 * \ln(P_o)] + 0.622$
> 51 Watts	≥ 0.870

Note: All efficiency values shall be rounded to the hundredths place.

Table 4: ErP Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Low Voltage Models

Nameplate Output Power (P_o)	Minimum Average Efficiency in Active Mode (expressed as a decimal)
0 to ≤ 1 Watt	$\geq 0.497 * P_o + 0.067$
> 1 to ≤ 51 Watts	$\geq [0.0750 * \ln(P_o)] + 0.561$
> 51 Watts	≥ 0.860

Note: All efficiency values shall be rounded to the hundredths place.

Table 5: ErPPower Consumption Criteria for No-Load

Nameplate Output Power (P_o)	Maximum Power in No-Load		
	Ac-Ac EPS	Ac-Dc EPS	Low Voltage EPS
0 to ≤ 51 watts	≤ 0.5 watts	≤ 0.3 watts	≤ 0.3 watts
> 51 watts	≤ 0.5 watts	≤ 0.5 watts	n/a

Table 6: CoCEnergy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum Four Point Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no} + 0.146$	$\geq 0.500 * P_{no} + 0.169$
> 1 to ≤ 49 Watts	$\geq 0.0626 * \ln(P_{no}) + 0.646$	$\geq 0.071 * \ln(P_{no}) - 0.00115 * P_{no} + 0.670$
>49 to ≤ 250 Watts	≥ 0.890	≥ 0.890

Note: All efficiency values shall be rounded to the hundredths place.

Table 7: CoCEnergy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum Four Point Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no} + 0.086$	$\geq 0.517 * P_{no} + 0.091$
> 1 to ≤ 49 Watts	$\geq 0.0755 * \ln(P_{no}) + 0.586$	$\geq 0.0834 * \ln(P_{no}) - 0.0011 * P_{no} + 0.609$
>49 to ≤ 250 Watts	≥ 0.880	≥ 0.880

Note: All efficiency values shall be rounded to the hundredths place.

Table 8: CoEnergy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum 10% Load Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to $\leq$ 1 Watt	$\geq 0.500 * P_{no} + 0.046$	$\geq 0.5 * P_{no} + 0.060$
> 1 to $\leq$ 49 Watts	$\geq 0.0626 * \ln(P_{no}) + 0.546$	$\geq 0.071 * \ln(P_{no}) - 0.00115 * P_{no} + 0.570$
>49 to $\leq$ 250 Watts	≥ 0.790	≥ 0.790
Note: All efficiency values shall be rounded to the hundredths place.		

Table 9: CoEnergy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum 10% Load Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to $\leq$ 1 Watt	$\geq 0.500 * P_{no}$	$\geq 0.517 * P_{no}$
> 1 to $\leq$ 49 Watts	$\geq 0.072 * \ln(P_{no}) + 0.500$	$\geq 0.0834 * \ln(P_{no}) - 0.00127 * P_{no} + 0.518$
>49 to $\leq$ 250 Watts	≥ 0.780	≥ 0.780
Note: All efficiency values shall be rounded to the hundredths place.		

Table 10: CoCPower Consumption Criteria for No-Load

Nameplate Output Power (P_{no})	Maximum Power in No-Load	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
≥ 0.3 to <49 Watts	≤ 0.150 watts	≤ 0.075 watts
≥ 49 to <250 Watts	≤ 0.250 watts	≤ 0.150 watts
Mobile handheld battery driven and < 8 W	≤ 0.075 watts	≤ 0.075 watts

Table 11 - Límite de eficiencia energética en modo activo y potencia en modo de no carga que deben cumplir las FAE

Clasificación según su nivel de tensión de salida	Tensión nominal de salida en c.c.	Con una Potencia de salida (P_o)	Nivel de Eficiencia	Límite mínimo de eficiencia energética en modo activo, mayor o igual que:	Límite máximo de potencia en modo de no carga menor o igual que:
Tensión de salida USB	5,0 V $\pm$ 0,25 V	Menor o igual que 1,0 W	V	$0,497 \times P_o + 0,087$	0,30
			VI	$0,517 \times P_o + 0,087$	0,10
		Mayor que 1,0 W y menor o igual que 49,0 W	V	$0,075 \times [L_n(P_o)] + 0,561$	0,30
			VI	$0,0834 \times [L_n(P_o)] - 0,0014 \times P_o + 0,609$	0,10
		Mayor que 49,0 W y menor o igual que 250,0 W	V	0,86	0,50
			VI	0,87	0,21
Baja tensión de salida	Menor a 6,0 V	Menor o igual que 1,0 W	V	$0,497 \times P_o + 0,087$	0,30
			VI	$0,517 \times P_o + 0,087$	0,10
		Mayor que 1,0 W y menor o igual que 49,0 W	V	$0,075 \times [L_n(P_o)] + 0,561$	0,30
			VI	$0,0834 \times [L_n(P_o)] - 0,0014 \times P_o + 0,609$	0,10
		Mayor que 49,0 W y menor o igual que 250,0 W	V	0,86	0,50
			VI	0,87	0,21
Tensión de salida genérica	Mayor o igual a 6,0 V	Menor o igual que 1,0 W	V	$0,480 \times P_o + 0,140$	0,30
			VI	$0,5 \times P_o + 0,16$	0,10
		Mayor que 1,0 W y menor o igual que 49,0 W	V	$0,0626 \times [L_n(P_o)] + 0,622$	0,30
			VI	$0,071 \times [L_n(P_o)] - 0,0014 \times P_o + 0,67$	0,10
		Mayor que 49,0 W y menor o igual que 250,0 W	V	0,87	0,50
			VI		
VI	0,88	0,21			

En donde:

 L_n : Logaritmo natural. El orden de las operaciones algebraicas requiere que el cálculo del logaritmo natural se realiza primero. P_o : Potencia de salida de la FAE

===== END OF DATASHEET PACKAGE. =====



ENERGY EFFICIENCY CERTIFICATION (EEC): Test Report - Cover Page

Customer Name: Mean Well Enterprises Co., Ltd.

Address: No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 24891 Taiwan

Brand Name(s):



Model Number(s): GST36B24, GST36E24, GST36U24

Product Category: EXTERNAL POWER SUPPLY

Representative (tested) Model: GST36B24

Model Differences: All models are identical except for model designation

The sample(s) tested is(are) compliant with the following applied standards/regulations:

NRCAN: Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II

US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609

US DoE: Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430

EU Directive for Energy-related Products ErP 2009/125/EC and Implementing Measure (IM) no. EC278/2009 for External Power Supply

Australian (Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014) and New Zealand (Minimum energy performance standards)

EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5

Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances

Test Location Name: MEAN WELL ENTERPRISES CO., LTD.

Test Location Address: 28 WUQUAN 3RD RD, WUGU DISTRICT, NEW TAIPEI, 248, TAIWAN

Testing Performed Under: ☐ UL Lab ☐ Private Label
☐ CTDP/SMTL ☒ WMTL ☐ EPA 3rd Party

UL Project No.: 4786997669 BA4, 4788995393-d

Project Handler: Hans Chen

Reviewed by: Evy Chang / Jasmin Wang

Issued: 2015-11-30

Revised: 2019-08-02

(yyyy-mm-dd)

(yyyy-mm-dd)

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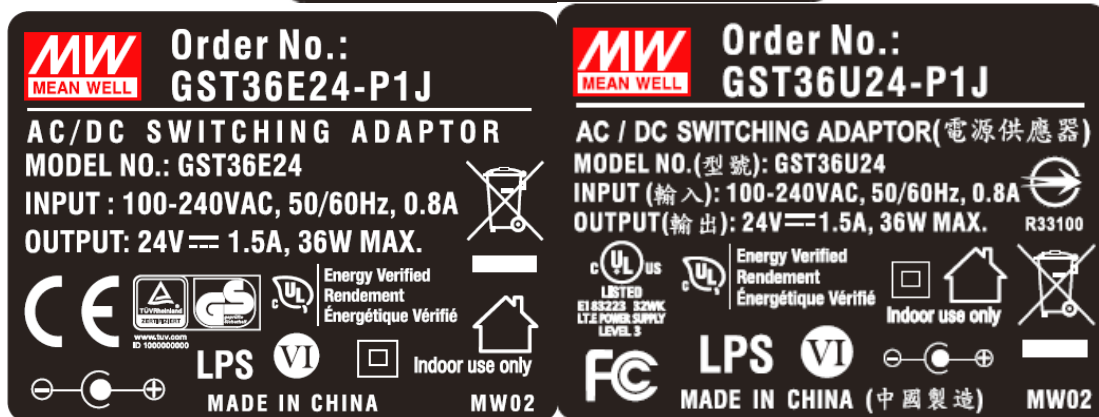


ATTACHMENT(S)

- Results Summary of International Efficiency Marking Protocol.
- Model(s) GST36B24, GST36E24, GST36U24 are Direct Operation, AC-DC, Low-Voltage type EPS.

Test	Result	Compliant, Y/N
The roman numeral mark of International efficiency marking protocol, if applicable	VI	Yes

Label information:



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Annex A1

Regulatory Body	Test Method, Regulation or Program Evaluated to	Test Limit per Regulation or Program Requirement		Measurements		Other
		Average Efficiency In Active Mode	No-Load Mode Power	Average Efficiency In Active Mode	No-Load Mode Power	
NRCan	10 CFR Parts 429 and 430	≥ 87.4 %	≤ 0.1 W	*90.11 %	**0.0336 W	Complied
DoE	10 CFR Parts 429 and 430	≥ 87.4 %	≤ 0.1 W	*90.11 %	**0.0336 W	Level VI
CEC	Appliance Efficiency Regulations, Sections 1601 through 1609	≥ 87.4 %	≤ 0.1 W	*90.11 %	**0.0336 W	Complied
ErP	Annex I(b) Of 2009/125/EC and Commission Regulation (EC) No 278/2009	≥ 84.8 %	≤ 0.3 W	90.33 %	0.0398 W	Complied
Australian (GEMS) and New Zealand	AS/NZS4665.1-2005+A1:2009; AS/NZS4665.2-2005+A1:2009	≥ 84.6 %	≤ 0.3 W	90.33 %	0.0396 W	'High efficiency' performance mark V; Mark VI mentioned in the IEMP
CoC	Energy Efficiency of External Power Supplies Version 5	≥ 88.3 % ≥ 78.3 % @10% load	≤ 0.075 W	90.33 % 87.09%	0.0420 W	Complied
Quebec	10 CFR Parts 429 and 430	≥ 87.4 %	≤ 0.1 W	*90.11 %	**0.0336 W	Complied

Additional Information:

See Energy Efficiency Laboratory Data Package of Project No: 4786997669 BA4 for further details and test results.

N/A = Not Applicable

* According to 10 CFR SUBPART B of PART 429.37 sampling plan for Active Mode:

LCL/0.95=94.633, Mean=90.214, n=3, 87.4 ≤ certified rating ≤ 90.214 (%), Certified rating is for registration purpose.

** According to 10 CFR SUBPART B of PART 429.37 sampling plan for No-Load Mode:

UCL/1.05=0.0336, Mean=0.0324, n=3, 0.1 W ≥ certified rating ≥ 0.0336 W, Certified rating is for registration purpose.

Project History:

For Project 4788995393-d:

1). Update regulations from NRCan: Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II to NRCan: Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II.

2). Update regulations from US CEC: Appliance Efficiency Regulations (California Code of Regulations, Title 20, Sections 1601 through 1608) dated July 2015 to US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609.

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- 3). Update regulations from Australian (GEMS) and New Zealand : AS/NZS4665.1-2005+A1:2009 ; AS/NZS4665.2-2005+A1:2009 to Australian (Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014) and New Zealand (Minimum energy performance standards).
- 4). Adding regulations Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances.
- 5). Update customer information from Mean Well Enterprises Co., Ltd., address No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 248 Taiwan to Mean Well Enterprises Co., Ltd., address No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 24891 Taiwan.

- Test waived by engineering judgement, due to the test results is complied with Quebec and NRCan energy efficiency regulations.

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DATA PACKAGE INFORMATION SHEET

Applicant Information	Name / Address:	MEAN WELL ENTERPRISES CO., LTD. 28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 248TAIWAN	
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Product Information	Standard(s):	☒ "Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies" dated August 11, 2004 International Efficiency Marking Protocol for External Power Supplies	
		☒ NRCan: Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II	
		☒ US CEC: Appliance Efficiency Regulations (California Code of Regulations, Title 20, Sections 1601 through 1608) dated July 2015	
		☒ US DoE: Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430	
		☒ Australian (GEMS) and New Zealand : AS/NZS4665.1-2005+A1:2009; AS/NZS4665.2-2005+A1:2009	
		☒ EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5	
		☒ Mexico: Secretaría de Energía, Director General de la Comisión Nacional para el Uso Eficiente de la - Catálogo de equipos y aparatos para los cuales los fabricantes, importadores, distribuidores y comercializadores deberán incluir información sobre su consumo energético	
		☐ Other:	
	CCNs:	ENVP	
	Product Name/Type:	External Power Supply ☒ AC-DC ☐ AC-AC	
	Model(s):	GST36B24	

Test Location Information	DAP and UL: ☐ CTDTP ☐ TCP ☐ TPTDP ☒ WTDP ☐ UL		
	Test Location Name/Address: MEAN WELL ENTERPRISES CO., LTD. 28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 248TAIWAN		
	Tests Conducted By**:	Sign	Frank Lin
		Print	Frank Lin
	**When all tests are conducted by one person, the printed name and signature can be inserted here instead of on each page containing data.		
	Authorized Signatory or TCP Reviewer:	Sign	--
		Print	--
		Date	--
	UL WTDP / WMT Witness:	Sign	Eddie Lu
Print		Eddie Lu	

Reviewed & Accepted	Qualified Project Handler:	Sign	Nat Liu/ Amos Chen
		Print	Nat Liu/ Amos Chen

LIST OF TESTS

<u>Test Name</u>	<u>Page</u>
ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:.....	9
ACTIVE MODE POWER CONSUMPTION TEST at 10% LOADING:.....	17
ACTIVEMODE POWER CONSUMPTION TEST at 10% LOADING (Mandatory for CoC, Optional for other than CoC): ..	18
WORKSHEETS.....	19

Special Instructions:

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

Standard	Ambient Temperature °C	Relative Humidity RH %	Supply Voltage Tolerance%	Total Harmonic Distortion THD %	Airspeed, room m/s	Supply Frequency Tolerance %
--	23±5	10-80	±1	<2	≤0.5	±1

NOTE:

The input voltage source shall be capable of delivering at least 10 times the nameplate input power of the UUT (as is specified in IEEE 1515-2000).

Witness Test Data Program (WTDP) Information:**Environment:**

Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025 Clause 5.3.1, 5.3.2, 5.3.3) ☒ Yes ☐ No ☐ N/A

Equipment:

Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025 5.6.2.2) ☒ Yes ☐ No

Critical Consumables:

Critical consumables are compliant with test standard requirements. (ISO/IEC 17025 Clause 4.6) ☐ Yes ☐ No ☒ N/A

Sample Identification:

Identification of items to be tested has been made (e.g. model no., Serial No., etc.) (See Test Sample Identification page and ISO/IEC 17025 Clause 5.8.2) ☒ Yes ☐ No

Summary:

The test facility was deemed to have the environment and capabilities necessary to perform the tests included in this data package. ☒ Yes ☐ No

TEST SAMPLE IDENTIFICATION

The table below is to provide correlation of sample numbers to specific product related information. Refer to this table when a test identifies a test sample by "Sample No." only.

Sample Number	Sample Card Number	Date Received	Manufacturer, Product Identification and Ratings
0919001-1	0919001	2015-07-21	Mean Well, External Power Supply, GST36B24 I/P:100-240VAC, 50/60HZ, 0.8A; O/P:24Vdc, 1.5A, 36W Max.
0919001-2	0919001	2015-07-21	Mean Well, External Power Supply, GST36B24 I/P:100-240VAC, 50/60HZ, 0.8A; O/P:24Vdc, 1.5A, 36W Max.
0919001-3	0919001	2015-07-21	Mean Well, External Power Supply, GST36B24 I/P:100-240VAC, 50/60HZ, 0.8A; O/P:24Vdc, 1.5A, 36W Max.
Sampling Procedure (if used) :		NA	

TEST INSTRUMENTS REFERENCE LIST

Instr. Code	Instrument I.D.	Instrument Type	Range Used Or ***	Make and Model **	Calibration Date	
					Last	Due
11	6314A0001880	DC Electronic Load	Max.80V,60A	Chroma / 6314A+, 63103A	2015-04-17	2016-04-16
17	662022004344	Digital Power Meter	600V, 20A, 63Hz	Chroma / 66202	2015-04-17	2016-04-16
25	ACS002	Frequency Converter	47/50/60/120/120/240/450Hz	Chroma / 6530	2015-06-08	2016-06-07
26	Q887652	Anemometer	0.50 m/s ~ 20.0 m/s	Lutron / AM-4214SD	2015-08-07	2016-08-06
27	15250924	Thermo-Hygrograph	10°C ~ +40°C 30%~80%RH	OMEGA / iTHX-SD	2018-08-18	2016-08-17
UL-PA066	91LC35759	Power Analyzer	V:15/30/60/150/300/600(AC/DC) A:5mA/10mA/20mA/50mA/100mA/200mA/ 0.5A/1A/2A/5A/10A/20A(AC/DC) Harmonics:Full Range W:Full Range P.F.:Full Range	YOKOGAWA / WT210	2015-02-06	2016-02-29
UL-PA078	91N114682	Power Analyzer	V:15/30/60/150/300/600(AC/DC) A:5mA/10mA/20mA/50mA/100mA/200mA/ 0.5A/1A/2A/5A/10A/20A(AC/DC) W:Full Range P.F.:Full Range	YOKOGAWA / WT210	2015-02-06	2016-02-29

"Chamber setting(s) ☐ was ☐ were monitored to ensure that the setting(s) ☐ was ☐ were stable throughout the test time frame. Any deviations from the setting(s) are noted below.

Date	Test	Instrument Code	Time period of deviation	Setting(s)
N/A	N/A	N/A	N/A	N/A

** Information to be recorded when tests are conducted at a non-UL facility.

*** Refer to specific data sheet for individual scale used.

☐ Test equipment information is recorded on UL's Laboratory Project Management (LPM)/Laboratory Equipment Management (LEM) database. (This statement may be selected only if datasheets are completed at a UL facility)

POWER SUPPLY REFERENCE PAGE (ENGINEERING TO COMPLETE)

Product Name/Type:	External AC/DC Power Supply (EPS)	
Manufacturer:	MEAN WELL ENTERPRISES CO., LTD.	
Brand Name:		
Model Number/Designation:	GST36B24	
Model differences:	N/A	
Class A External Power supply	☒ Yes ☐ No	
External Power Supply Product Class ID	☒ B	Direct Operation, AC-DC, Basic-Voltage
	☐ C	Direct Operation, AC-DC, Low-Voltage (except those with nameplate output voltage less than 3 volts and nameplate output current greater than or equal to 1,000 milliamps that charge the battery of a product that is fully or primarily motor operated)
	☐ D	Direct Operation, AC-AC, Basic-Voltage
	☐ E	Direct Operation, AC-AC, Low-Voltage
	☐ H	Direct Operation, High-Power
	☐ N	Indirect Operation

Nameplate Rating:	Input:	100-240VAC, 50/60HZ, 0.8A
	Output:	24Vdc, 1.5A

Each sample was tested at:	☐ 115V, 60Hz	☐ 230V, 50Hz	☒ Both
UUT Output Cord Length (± 1 cm):	100		
UUT is a Replacement EPS:	☐ Yes	☒ No	☐ N/A
Presence of Input Power Switch (Y/N):	☐ Yes	☒ No	
Input Power Switch (ON/OFF):	☐ ON	☐ OFF	☒ N/A
End Product Powered by the UUT:	N/A		

Notes/Comments:

☒ For Mexico EE - Las pruebas realizadas en 115/230 Vacaan consideradas representativas al 127/220 Vac. (Tests performed on 115/230 Vac were considered representative to 127/220 Vac.)

TECHNICIAN'S REFERENCE PAGE

DEFINITIONS

“UUT”: UUT is any acronym for “Unit Under Test”

“Low Voltage External Power Supply”: An external power supply (EPS) with a nameplate output voltage of less than 6 volts and a nameplate output current greater than or equal to 550 milliamperes.

“Active Mode”: The condition in which the input of a power supply is connected to line voltage ac and the output is connected to an ac or a dc load drawing a fraction of the power supply's nameplate power output greater than zero.

“Active Mode Efficiency”: The ratio, expressed as a percentage, of the total active output power (ac or dc) produced by a power supply to the active input power (ac) required to produce the total active output power.

“No-Load Mode”: The condition in which the input of a power supply is connected to an ac source consistent with the power supply's nameplate ac voltage, but the output is not connected to a product or any other load.

“Power Factor (True)”: The true power factor is the ratio of the active or real power (P) consumed in watts to the apparent power (S), drawn in volt-amperes (VA).

$$PF = P/S$$

“Basic-Voltage External Power Supply”: An external power supply is not a low-voltage external power supply.

“Direct Operation External Power Supply”: An external power supply can operate a consumer product that is not a battery charger without the assistance of a battery.

“Indirect Operation External Power Supply”: An external power supply cannot operate a consumer product that is not a battery charger without the assistance of a battery.

POWER MEASUREMENTS

All power figures should be in watts and rounded to the second decimal place. For loads greater than or equal to 10 W, three significant figures shall be reported.

Where the measured power is not stable, average power readings over a user-selected period are used in this case. The test instrument shall record the true average power over a user selected period, the period selected shall not be less than 5 minutes. If the power varies over a cycle, the period selected to average power shall be one or more complete cycles.

INPUT METER CONSIDERATIONS

The power measurement instrument shall have a resolution of:

- 0.01 W or better for power measurements of 10 W or less;
- 0.1 W or better for power measurements of greater than 10 W up to 100 W; and
- 1 W or better for power measurements of greater than 100 W.

The following attributes in addition to those above are suggested for the input power meter:

- Frequency response of at least 3 kHz.

Power measurement instrument having the ability to average power accurately over any user-selected time interval (this is usually done with an internal math calculation dividing accumulated energy by time within the meter, which is the most accurate approach).

TECHNICIAN'S REFERENCE PAGE (Cont'd)

INSTRUCTIONS – TEST PREPARATION AND LOADING

“Built-in switch”: if a built-in switch in the UUT control power flow to the ac input, it shall be ON position for measurement.

“Output Cord”: the UUT must be tested with the output cord supplied by the manufacturer.

Metering equipment shall be connected to the output of the power supply by:

Cutting the cord immediately adjacent to the output connector

Attaching leads and measuring the efficiency from the output connector itself

Where the UUT is directly connected to the end product that it is powering, the cord immediately adjacent to the powered product shall be cut and output measurement probes shall be connected at that point.

“UUT with more than 2 output wires”: in similar cases, the tests shall be conducted on two output wires that supply power to the product. The other output wires (i.e.: used for battery monitoring) shall be left disconnected.

“UUT with switchable output”: in similar cases, the UUT shall be tested for each output voltage, one at a time.

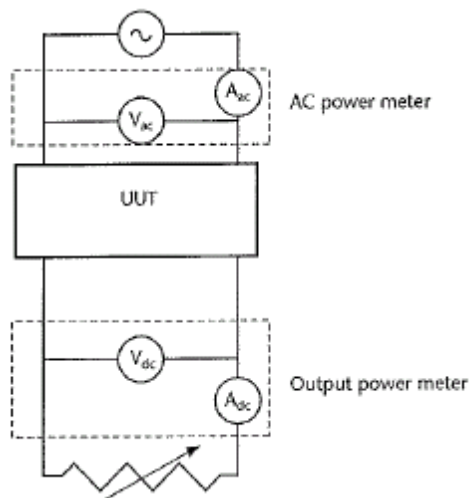
“Loading”: A set of variable Resistive or Electronics Loads shall be used to load the power supply to produce the four active-mode load conditions specified in Table 1 (Load Conditions 1 to 4). While this load may differ from the electronic loads that EPS are designed to power, they provide standardized and repeatable references for testing and product comparison.

When an Electronic Load is used for the output loading, the desired output current should be adjusted in constant current (CC) mode rather than adjusting the required output power in constant power (CP) mode.

When a Resistive Load is used, it needs to be measured precisely with an ohmmeter, a variable resistor may be adjusted to the point where an ammeter confirms that the desired percentage of nameplate output current is flowing through the load.

Figure A1 shows an external power supply test set-up using a variable resistance as the load.

Figure A1 – Generic test set-up using a variable resistive load



Tested by: Frank Lin	Tested by: Frank Lin	Test Date: 2015-11-06
signature	print	
Sample # : 0919001-1 , 0919001-2 , 0919001-3	Instrument Code / Range:	

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:

TESTING SEQUENCE:

The UUT shall be tested at each load condition specified in Table 1, testing consecutively from Load Condition 1 (100% Load) to Load Condition 5(No-Load).

The UUT shall be operated at 100% of nameplate current output (Table 1: Load Conditions 1) for at least 30 minutes immediately prior to conducting efficiency measurements.

For Agencies other than NRCAN, after the warm-up period, the technician shall monitor AC input power for a period of 5 minutes to assess the stability of the UUT. If the power level does not drift by more than 5% from the maximum value observed, the UUT can be considered stable and the indicated measurements can be recorded at the end of the 5 minute period.

For NRCAN, after the warm-up period, the unit shall continue to run in the load condition and the power shall be recorded after using the Accumulated Energy approach outlined in CAN/CSA 62301 clause 5.3.2b for at least 5 minutes.

NOTE: To ensure consistent units, it is recommended that watt-hours and hours be used above, to give watts.

For Agencies other than NRCAN, subsequent Load Conditions 2 - 5 (See Table 1) can then be measured under the same 5 minute stability guidelines. Please take note that only for compliance with requirements in NRCAN programs and CSA/CAN381.1-08, the UUT shall operate under each of the subsequent active/no-load mode conditions (Table 1: Load Conditions 2 to 5) for a minimum warm-up period of not less than 30 minutes.

While the unit operates under each of the subsequent Load Conditions from 2 to 5 (See Table 1) for a period of time not less than required warm-up period, the technician shall record all the indicated measurements two (2) times for each Load Condition, as indicated below:

1st Measurement (required for all Agencies except NRCAN): the technician shall monitor ac input power for a period of 5 minutes to assess the stability of the UUT (See of Table 1, 2 and 3 for details). If the power level does not drift by more than 5% from the maximum value observed, the UUT shall be considered stable and the measurements can be recorded at the end of the 5 minute period. When AC input power is not stable over the 5 minute period, the technician shall follow the guidelines established by IEC62301, Clause 5.3.2 (a) for measuring average power or Clause 5.3.2 (b) for measuring accumulated energy over time for both AC input and DC output⁽¹⁾.

2nd Measurement (required for NRCAN only): After the mandatory 30 minutes warm-up period for each of the subsequent Load Conditions (See of Table 1, 2 and 3 for details) the unit shall continue to run in the load condition and the power shall be recorded after using the Accumulated Energy approach outlined in CAN/CSA 62301 clause 5.3.2b for at least 5 minutes.

⁽¹⁾ = IEC62301 and CAN/CSA62301 standards are intended to measure input power, however the methods specified in Clauses 5.3.2 (a) and 5.3.2 (b), may be used to measure Output power for the purposes of this testing.

The sequence mentioned above at items 1 and 2 shall be repeated for each Load Conditions from 2 to 5 in Table 1.

For Australia/New Zealand requirements (AuNZ), if a power supply has only a 240V, 50Hz input, conduct the testing at 240 V, 50Hz input and record the data in the 230V tables for ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST. Indicate on the data tables that testing was conducted at 240V, 50 Hz input.

Tested by: <u>Frank Lin</u> signature	Tested by: <u>Frank Lin</u> print	Test date: <u>2015-11-06</u>
Sample # : <u>0919001-1 , 0919001-2 , 0919001-3</u>	Instrument Code / Range: _____	

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

TESTING SEQUENCE (Cont'd)

The above testing sequence shall be repeated on three (3) units in total of the same UUT.

Table 1 – Load Conditions and testing sequence

Load Conditions for UUT	Percentage of Nameplate Output Current	Warm-up period by Load Conditions [minutes]	Assessment period after warm-up [minutes]	Number of measurement(s) by Load Conditions
1	100% $\pm$ 2% ⁽²⁾	30	5 0 (NRCAN)	1 other Agencies 5 min Accumulated Energy
2	75% $\pm$ 2%	0 (for other agencies)	5	1 for other Agencies
		30 (for NRCAN)	0	5 min Accumulated Energy
3	50% $\pm$ 2%	0 (for other agencies)	5	1 for other Agencies
		30 (for NRCAN)	0	5 min Accumulated Energy
4	25% $\pm$ 2%	0 (for other agencies)	5	1 for other Agencies
		30 (for NRCAN)	0	5 min Accumulated Energy
5	0%	0 (for other agencies)	5	1 for other Agencies
		30 (for NRCAN)	0	5 min Accumulated Energy

Note(s):

- ⁽²⁾The 2% allowance is of nameplate output current, not of the calculated current value.
- For example, a UUT at Load Condition 3 may be tested in a range from 48% (min) to 52% (max) of rated output current.
- It is mandatory for CoC. The UUT shall be considered 10% $\pm$ 2% of nameplate output current after load condition 4, warm up period is 0 minute and 5 minutes is for assessment period, and then continue condition 5.

Comments:

- If test has not been performed in accordance with requirements in NRCAN: Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II; technician shall fill all cells related to NRCAN results with “-” or leave them “blank”.
- If test has been performed in accordance with requirements in NRCAN program only, technician shall fill all cells related to results for all other Agencies other than NRCAN with “-” or leave them “blank”.
- If instantaneous power measurement is acceptable, technician record the instantaneous power measurement under the column “***Avg. Power (W)” and then shall fill cells of columns “Wh” and “Wh Interval” with “-” or leave them “blank”.

Tested by: Frank Lin Tested by: Frank Lin Test date: 2015-11-06
signature print
Sample #: 0919001-1 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:(Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 1
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 1.5

External Power Supply Input Electric Data											Power Supply [DC] Output			
Load #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	114.71	60.00	0.631	0.56	0.20	3.3619	40.3428	5	30 (All)	0.05	24.06	1.50	3.0127	36.1524
2 (75%)	114.74	60.00	0.491	0.53	0.19	2.5055	30.0660	5	0 (others)	0.03	24.06	1.12	2.2584	27.1008
	114.74	60.00	0.491	0.53	0.19	2.5055	30.0660	5	30 (NRCan)	0.03	24.06	1.12	2.2584	27.1008
3 (50%)	114.76	60.00	0.348	0.50	0.16	1.6652	19.9824	5	0 (others)	0.05	24.07	0.75	1.5030	18.0360
	114.76	60.00	0.348	0.50	0.16	1.6652	19.9824	5	30 (NRCan)	0.05	24.07	0.75	1.5030	18.0360
4 (25%)	114.79	60.00	0.192	0.45	0.13	0.8262	9.9144	5	0 (others)	0.08	24.07	0.37	0.7494	8.9928
	114.79	60.00	0.192	0.45	0.13	0.8262	9.9144	5	30 (NRCan)	0.08	24.07	0.37	0.7494	8.9928
5 (0%)	114.81	60.00	0.013	0.02	0.13	0.0026	0.0312	5	0 (others)	32.51				
	114.81	60.00	0.013	0.02	0.13	0.0026	0.0312	5	30 (NRCan)	32.51				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)					NRCan - Average results Efficiency of Power Supply (after 30 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4	100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
89.613	90.1377	90.25943	90.70443	90.17864293	89.61302	90.1377	90.25943	90.7044299	90.17864293

Other than NRCan - Power Consumed by UUT (W)					NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load	100%	75%	50%	25%	No Load
4.1904	2.9652	1.9464	0.9216	0.0312	4.1904	2.9652	1.9464	0.9216	0.0312

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test date: 2015-11-06
signature print
Sample # : 0919001-2 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 2
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 1.5

External Power Supply Input Electric Data											Power Supply [DC] Output			
Load #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	114.71	60.00	0.632	0.56	0.18	3.3795	40.5540	5	30 (All)	0.02	24.15	1.50	3.0241	36.2892
2 (75%)	114.74	60.00	0.492	0.53	0.16	2.5182	30.2184	5	0 (others)	0.03	24.14	1.12	2.2669	27.2028
	114.74	60.00	0.492	0.53	0.16	2.5182	30.2184	5	30 (NRCan)	0.03	24.14	1.12	2.2669	27.2028
3 (50%)	114.76	60.00	0.347	0.50	0.13	1.6757	20.1084	5	0 (others)	0.05	24.15	0.75	1.5103	18.1236
	114.76	60.00	0.347	0.50	0.13	1.6757	20.1084	5	30 (NRCan)	0.05	24.15	0.75	1.5103	18.1236
4 (25%)	114.79	60.00	0.190	0.46	0.13	0.8313	9.9756	5	0 (others)	0.20	24.14	0.37	0.7549	9.0588
	114.79	60.00	0.190	0.46	0.13	0.8313	9.9756	5	30 (NRCan)	0.20	24.14	0.37	0.7549	9.0588
5 (0%)	114.81	60.00	0.013	0.02	0.13	0.0027	0.0324	5	0 (others)	30.94				
	114.81	60.00	0.013	0.02	0.13	0.0027	0.0324	5	30 (NRCan)	30.94				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)					NRCan - Average results Efficiency of Power Supply (after 30 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4	100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
89.484	90.02065	90.1295	90.80958	90.11084365	89.48365	90.02065	90.1295	90.8095754	90.11084365

Other than NRCan - Power Consumed by UUT (W)					NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load	100%	75%	50%	25%	No Load
4.2648	3.0156	1.9848	0.9168	0.0324	4.2648	3.0156	1.9848	0.9168	0.0324

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-11-06
signature print
Sample #: 0919001-3 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 3
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 1.5

External Power Supply Input Electric Data											Power Supply [DC] Output			
Load #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	114.71	60.00	0.627	0.56	0.17	3.3795	40.5540	5	30 (All)	0.02	24.26	1.50	3.0318	36.3816
2 (75%)	114.74	60.00	0.487	0.54	0.15	2.5154	30.1848	5	0 (others)	0.03	24.26	1.12	2.2699	27.2388
	114.74	60.00	0.487	0.54	0.15	2.5154	30.1848	5	30 (NRCan)	0.03	24.26	1.12	2.2699	27.2388
3 (50%)	114.77	60.00	0.345	0.51	0.13	1.6721	20.0652	5	0 (others)	0.06	24.26	0.75	1.5110	18.1320
	114.77	60.00	0.345	0.51	0.13	1.6721	20.0652	5	30 (NRCan)	0.06	24.26	0.75	1.5110	18.1320
4 (25%)	114.79	60.00	0.189	0.46	0.12	0.8261	9.9132	5	0 (others)	0.12	24.25	0.37	0.7526	9.0312
	114.79	60.00	0.189	0.46	0.12	0.8261	9.9132	5	30 (NRCan)	0.12	24.25	0.37	0.7526	9.0312
5 (0%)	114.81	60.00	0.013	0.02	0.13	0.0028	0.0336	5	0 (others)	29.25				
	114.81	60.00	0.013	0.02	0.13	0.0028	0.0336	5	30 (NRCan)	29.25				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)					NRCan - Average results Efficiency of Power Supply (after 30 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4	100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
89.711	90.24012	90.36541	91.10277	90.35494937	89.7115	90.24012	90.36541	91.1027721	90.35494937

Other than NRCan - Power Consumed by UUT (W)					NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load	100%	75%	50%	25%	No Load
4.1724	2.946	1.9332	0.882	0.0336	4.1724	2.946	1.9332	0.882	0.0336

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-11-06
signature print
Sample # : 0919001-1 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 1
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 1.5

External Power Supply Input Electric Data											Power Supply [DC] Output			
Load #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	229.58	50.00	0.411	0.42	0.25	3.3361	40.0332	5	30	0.05	24.05	1.50	3.0130	36.1560
2 (75%)	229.59	50.00	0.323	0.40	0.23	2.5074	30.0888	5	0	0.07	24.07	1.12	2.2590	27.1080
3 (50%)	229.62	50.00	0.221	0.39	0.20	1.6616	19.9392	5	0	0.10	24.07	0.75	1.5047	18.0564
4 (25%)	229.63	50.00	0.117	0.37	0.17	0.8305	9.9660	5	0	0.10	24.06	0.37	0.7507	9.0084
5 (0%)	229.65	50.00	0.019	0.01	0.14	0.0033	0.0396	5	0	49.88				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
90.315	90.09332	90.55729	90.39133	90.33924674

Other than NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load
3.8772	2.9808	1.8828	0.9576	0.0396

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-11-06
signature print
Sample # : 0919001-2 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 2
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 1.5

External Power Supply Input Electric Data											Power Supply [DC] Output			
Load #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	229.58	50.00	0.408	0.43	0.23	3.3465	40.1580	5	30	0.05	24.11	1.50	3.0212	36.2544
2 (75%)	229.61	50.00	0.317	0.41	0.21	2.5176	30.2112	5	0	0.07	24.14	1.13	2.2668	27.2016
3 (50%)	229.62	50.00	0.216	0.40	0.18	1.6677	20.0124	5	0	0.15	24.15	0.75	1.5116	18.1392
4 (25%)	229.63	50.00	0.116	0.37	0.16	0.8348	10.0176	5	0	0.12	24.14	0.38	0.7558	9.0696
5 (0%)	229.65	50.00	0.019	0.01	0.14	0.0034	0.0408	5	0	49.18				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
90.279	90.03813	90.6398	90.53666	90.37349669

Other than NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load
3.9036	3.0096	1.8732	0.948	0.0408

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-11-06
signature print
Sample # : 0919001-3 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 3
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 1.5

External Power Supply Input Electric Data											Power Supply [DC] Output			
Load #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	229.58	50.00	0.394	0.44	0.21	3.3518	40.2216	5	30	0.05	24.26	1.50	3.0321	36.3852
2 (75%)	229.60	50.00	0.304	0.43	0.19	2.5180	30.2160	5	0	0.03	24.27	1.12	2.2721	27.2652
3 (50%)	229.63	50.00	0.209	0.41	0.17	1.6583	19.8996	5	0	0.15	24.25	0.75	1.5128	18.1536
4 (25%)	229.64	50.00	0.115	0.38	0.15	0.8315	9.9780	5	0	0.08	24.25	0.37	0.7536	9.0432
5 (0%)	229.64	50.00	0.019	0.01	0.14	0.0035	0.0420	5	0	23.79				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
90.462	90.23431	91.22595	90.63139	90.63837442

Other than NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load
3.8364	2.9508	1.746	0.9348	0.0420

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test date: 2015-11-06
signature print
Sample # : 0919001-1 , 0919001-2 , 0919001-3 Instrument Code / Range: _____

ACTIVEMODE POWER CONSUMPTION TEST at 10% LOADING:

RESULTS:

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 1.5

	External Power Supply Input Electric Data										Power Supply [AC] [DC] Output			
Sample #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1	114.80	60.00	0.086	0.40	0.13	0.3307	3.9684	5	0	0.18	24.06	0.15	0.2968	3.5616
2	114.80	60.00	0.087	0.40	0.12	0.3357	4.0284	5	0	0.12	24.14	0.15	0.3010	3.6120
3	114.80	60.00	0.086	0.40	0.12	0.3292	3.9504	5	0	0.28	24.25	0.15	0.2964	3.5568

Sample #	Efficiency Value (%)
1	89.749
2	89.663
3	90.036

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test date: 2015-11-06
signature print
Sample # : 0919001-1 , 0919001-2 , 0919001-3 Instrument Code / Range: _____

ACTIVEMODE POWER CONSUMPTION TEST at 10% LOADING (Mandatory for CoC, Optional for other than CoC):

RESULTS:

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 1.5

	External Power Supply Input Electric Data										Power Supply [AC] [DC] Output			
Sample #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1	229.65	50.00	0.057	0.31	0.15	0.3407	4.0884	5	0	0.15	24.07	0.15	0.2975	3.5700
2	229.65	50.00	0.057	0.31	0.14	0.3435	4.1220	5	0	0.12	24.14	0.15	0.3012	3.6144
3	229.64	50.00	0.058	0.31	0.14	0.3409	4.0908	5	0	0.10	24.25	0.15	0.2969	3.5628

Sample #	Efficiency Value (%)
1	87.320
2	87.686
3	87.093

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

WORKSHEETS

The measured is the following:

Minimum Average Efficiency in Active Mode	Input Voltage (V ac):	☒ 115V, 60Hz		☒ 230V, 50Hz	☒ 115/230V, 50/60Hz	☐ Other: V, Hz
		NRCan	Other Then NRCan			
	Sample No.:	--	0919001-2	0919001-1	0919001-2	
	Efficiency (%):	--	90.1	90.3	90.1	
Minimum 10% Load Average Efficiency in Active Mode	Sample No.:	--	0919001-2	0919001-3	0919001-3	
	Efficiency (%):	--	89.6	87.0	87.0	
Maximum Power In No-Load Condition	Sample No.:	--	0919001-3	0919001-3	0919001-3	
	Power (W) :	--	0.033	0.042	0.042	

Note:

☐ There are two measurements at 115Vac, 60Hz, due to the test methods is different between NRCan and the other regulations.

☒ For NRCan testing, according to guidance form the letter to CB for EPS testing 4-16-12, the test procedure is following "Test Method for Calculating the Energy Efficiency of Single-Voltage External Ac-Dc and Ac-Ac Power Supplies," August 11,2004, in APPENDIX Z to SUBPART B of PART 430 instead of C381.1-08. The results are more than .8 (>) above the minimum efficiency standard.

International Efficiency Marking Protocol (IEMP) for External Power Supplies:

Base on Table 2, this EPS is complied with the requirements for level: VI at ☒115V ac; ☒230V ac;
The calculated Minimum Average Efficiency in Active Mode is:0.874 (87.4%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.100Watt.

☐ The true power factor was 0.9 or greater at 100% of rated load when tested at 115V, 60Hz. This requirement applies only to Level V power supplies with input power greater than or equal to 100W at 115V, 60Hz.

Canada NRCan Energy Efficiency Requirements: (at 115V ac, 60Hz)

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is:0.823(82.3%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.5 Watt.

This ☒complies ☐does not comply with requirements in:

Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II

US DoE and CEC Requirements for Class A external power supply: (at 115V ac, 60Hz)

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is:0.823 (82.3%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.5 Watt.

This ☒complies ☐does not comply with requirements in:

☒ **US DoE:** Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430

☒ **US CEC:** Appliance Efficiency Regulations (California Code of Regulations, Title 20, Sections 1601 through

1608), dated May, 2014 (CEC-400-2014-009-CMF)

WORKSHEETS (CONT'D)**US DoE Requirements for Direct operation external power supply: (at 115V ac, 60Hz)**

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is:0.874 (87.4%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.100Watt.

This ☒ complies ☐ does not comply with requirements in:

Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430

Australian and New Zealand: (at 230V ac or 240V ac, 50Hz)

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is:0.846 (84.6%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.300Watt.

This ☒ complies ☐ does not comply with performance mark ☒III; ☒IV; ☒V requirements in:

Australian Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014 and New Zealand Energy Efficiency (Energy Using Products) Regulations 2002

Note:

For **Australian**, according to Clause 8(1)(b) in Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014, if a product exceeds the energy performance requirements for Mark V as mentioned in Appendix A of AS/NZS 4665.1:2005 and meets the performance requirements for Mark VI mentioned in the IEMP then the product may be labelled in accordance with the requirements for:

(i) Mark V mentioned in Appendix A of AS/NZS 4665.1:2005 and sections 4.2 and 5 of AS/NZS 4665.2:2005 (Energy Performance Mark); or (ii) Mark VI mentioned in the IEMP.

European Union (EU) Code of Conduct: (at 230V ac, 50Hz)

Base on Table 3, 4, 5, 6, and 7, the calculated Minimum Average Efficiency in Active Mode is:Tier1 : 0.870(87.0%), Tier2 : 0.883(88.3%), at 10% Load is:Tier1 : 0.770(77.0%), Tier2 : 0.783(78.3%),and Maximum Energy Consumption in No-Load Mode is not greater than Tier1 : 0.150, Tier2 : 0.075Watt.

This ☒ complies ☐ does not comply with ☒ Tier 1 and ☒ Tier 2 requirements for **Code of Conduct on Energy Efficiency of External Power Supplies, Version 5.**

MEXICO CONUEE and PROFECO: Energy Consumption Information

1) Energy consumption by unit of time under normal operating conditions of the equipment or appliance ⁽¹⁾:40.554 Wh. If applicable⁽²⁾:

2) Consumption of energy in idle mode in unit of time of the equipment or appliance ⁽³⁾:0.042 Wh.

Notes:

(1) This is the consumption under full charge conditions and for a 1 hour period of time. The consumption must be indicated in the following units: kW-h/year, kW-h /month W-h /day.

(2) In accordance with Article 26, section II, of the Regulation of the Law for the Sustainable Use of Energy, if applicable, it must indicate the consumption of energy in idle mode by unit of time. If not applicable, write "not applicable."

(3) This is the passive electric energy consumption, when the appliance or equipment is connected to the electrical power circuit, even when the equipment is off, and not performing its main function. The consumption must be indicated in the following units: kW-h/year, kW-h /month W-h /day.

(4). The energy consumption for a hour (Wh) is calculated by the following equation:

The Maximum Avg. Power (Watts) at 100% load x1 hour (h).

Table 2: International Efficiency Marking Protocol for External Power Supplies;

Mark	Performance Requirements				
	Nameplate Output Power (P_{no}) ²	No-Load Mode Power ³	Nameplate Output Power (P_{no})	Average Efficiency in Active Mode ⁴	Power Factor
I	Used if none of the other criteria are met.				
II	0 to ≤ 10 W	≤ 0.75	0 to < 1 W	≥ 0.39 * P_{no}	Not Applicable
	> 10 to 250 W	≤ 1.0	1 to < 49 W	≥ 0.107 * $\ln(P_{no})$ + 0.39	
			> 49 W	≥ 0.82	
III	0 to < 10 W	≤ 0.5	0 to 1 W	≥ 0.49 * P_{no}	Not Applicable
	10 to 250 W	≤ 0.75	> 1 to 49 W	≥ 0.09 * $\ln(P_{no})$ + 0.49	
			> 49 to 250 W	≥ 0.84	
IV	0 to 250 W	≤ 0.5	0 to < 1 W	≥ 0.5 * P_{no}	Not Applicable
			1 to 51 W	≥ 0.09 * $\ln(P_{no})$ + 0.5	
			> 51 to 250 W	≥ 0.85	
V	0 to < 50 W	AC-DC: ≤ 0.3 AC-AC: ≤ 0.5	0 to ≤ 1 W	Basic Voltage: ≥ 0.480 * P_{no} + 0.140 Low Voltage ⁵ : ≥ 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.
	≥ 50 to ≤ 250 W	≤ 0.5	> 1 to ≤ 49 W	Basic Voltage: ≥ 0.0626 * $\ln(P_{no})$ + 0.622 Low Voltage: ≥ 0.0750 * $\ln(P_{no})$ + 0.561	
			> 49 to 250 W	Basic Voltage: ≥ 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.				

Table 3: Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum Four Point Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no} + 0.146$	$\geq 0.500 * P_{no} + 0.169$
> 1 to ≤ 49 Watts	$\geq 0.0626 * \ln(P_{no}) + 0.646$	$\geq 0.071 * \ln(P_{no}) - 0.00115 * P_{no} + 0.670$
> 49 to ≤ 250 Watts	≥ 0.890	≥ 0.890
Note: All efficiency values shall be rounded to the hundredths place.		

Table 4: Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum Four Point Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no} + 0.086$	$\geq 0.517 * P_{no} + 0.091$
> 1 to ≤ 49 Watts	$\geq 0.0755 * \ln(P_{no}) + 0.586$	$\geq 0.0834 * \ln(P_{no}) - 0.0011 * P_{no} + 0.609$
> 49 to ≤ 250 Watts	≥ 0.880	≥ 0.880
Note: All efficiency values shall be rounded to the hundredths place.		

Table 5: Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum 10% Load Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no} + 0.046$	$\geq 0.5 * P_{no} + 0.060$
> 1 to ≤ 49 Watts	$\geq 0.0626 * \ln(P_{no}) + 0.546$	$\geq 0.071 * \ln(P_{no}) - 0.00115 * P_{no} + 0.570$
> 49 to ≤ 250 Watts	≥ 0.790	≥ 0.790
Note: All efficiency values shall be rounded to the hundredths place.		

Table 6: Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum 10% Load Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no}$	$\geq 0.517 * P_{no}$
> 1 to ≤ 49 Watts	$\geq 0.072 * \ln(P_{no}) + 0.500$	$\geq 0.0834 * \ln(P_{no}) - 0.00127 * P_{no} + 0.518$
> 49 to ≤ 250 Watts	≥ 0.780	≥ 0.780
Note: All efficiency values shall be rounded to the hundredths place.		

Table 7: Power Consumption Criteria for No-Load

Nameplate Output Power (P_{no})	Maximum Power in No-Load	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
≥ 0.3 to < 49 Watts	≤ 0.150 watts	≤ 0.075 watts
≥ 49 to < 250 Watts	≤ 0.250 watts	≤ 0.150 watts
Mobile handheld battery driven and < 8 W	≤ 0.075 watts	≤ 0.075 watts

===== END OF DATASHEET PACKAGE. =====

DATA PACKAGE INFORMATION SHEET

Applicant Information	Name / Address:	MEAN WELL ENTERPRISES CO., LTD. 28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 248 TAIWAN
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Product Information	Standard(s):	☒ EU Directive for Energy-related Products ErP 2009/125/EC and Implementing Measure (IM) no. EC278/2009 for External Power Supply
		☒ EN50563-2011/A1:2013, External a.c. - d.c. and a.c. - a.c. power supplies – Determination of no-load power and average efficiency of active modes
		☒ EN50564-2011, Electrical and electronic household and office equipment - Measurement of low power consumption
		☐ Other:
	CCNs:	ENVP
Product Name/Type:	External Power Supply ☒ AC-DC ☐ AC-AC	
Model(s):	GST36B24	

Test Location Information	DAP and UL: ☐ CTDp ☐ TCP ☐ TPTDP ☒ WTDP ☐ UL	
	Test Location Name/Address: MEAN WELL ENTERPRISES CO., LTD. 28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 248 TAIWAN	
	Tests Conducted By**:	Sign Frank Lin
		Print Frank Lin
	**When all tests are conducted by one person, the printed name and signature can be inserted here instead of on each page containing data.	
	Authorized Signatory or TCP Reviewer:	Sign --
		Print --
		Date --
UL WTDP / WMT Witness:	Sign Eddie Lu	
	Print Eddie Lu	

Reviewed & Accepted	Qualified Project Handler:	Sign Nat Liu/ Amos Chen
		Print Nat Liu/ Amos Chen

LIST OF TESTS**Test Name****Page**

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Special Instructions:

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

Standard	Ambient Temperature °C	Relative Humidity RH %	Supply Voltage Tolerance%	Total Harmonic Distortion THD %	Airspeed, room m/s	Supply Frequency Tolerance %
--	23±5	10-80	±1	<2	≤0.5	±1

Per test standard EN50564, sub-clause 4.2, Where the product has an ambient light sensor that affects the power consumption, the test shall be carried out with controlled ambient light conditions. Where the illuminance levels are externally defined (in a test procedure or in the instructions for use), these values shall be used. Where no illuminance levels are stated or defined, reference illuminance levels of more than 300 lux and less than 10 lux shall be used.

Witness Test Data Program (WTDP) Information:**Environment:**

Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025 Clause 5.3.1, 5.3.2, 5.3.3)

☒ Yes ☐ No ☐ N/A

Equipment:

Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025 5.6.2.2)

☒ Yes ☐ No

Critical Consumables:

Critical consumables are compliant with test standard requirements. (ISO/IEC 17025 Clause 4.6)

☐ Yes ☐ No ☒ N/A

Sample Identification:

Identification of items to be tested has been made (e.g. model no., Serial No., etc.) (See Test Sample Identification page and ISO/IEC 17025 Clause 5.8.2)

☒ Yes ☐ No

Summary:

The test facility was deemed to have the environment and capabilities necessary to perform the tests included in this data package.

☒ Yes ☐ No

TEST INSTRUMENTS REFERENCE LIST

Instr. Code	Instrument I.D.	Instrument Type	Range Used Or ***	Make and Model **	Calibration Date	
					Last	Due
11	6314A0001880	DC Electronic Load	Max.80V,60A	Chroma / 6314A+, 63103A	2015-04-17	2016-04-16
17	662022004344	Digital Power Meter	600V, 20A, 63Hz	Chroma / 66202	2015-04-17	2016-04-16
25	ACS002	Frequency Converter	47/50/60/120/120/240/450Hz	Chroma / 6530	2015-06-08	2016-06-07
26	Q887652	Anemometer	0.50 m/s ~ 20.0 m/s	Lutron / AM-4214SD	2015-08-07	2016-08-06
27	15250924	Thermo-Hygrograph	10°C ~ +40°C 30%~80%RH	OMEGA / iTHX-SD	2018-08-18	2016-08-17
UL-PA066	91LC35759	Power Analyzer	V:15/30/60/150/300/600(AC/DC) A:5mA/10mA/20mA/50mA/100mA/200mA/ 0.5A/1A/2A/5A/10A/20A(AC/DC) Harmonics:Full Range W:Full Range P.F.:Full Range	YOKOGAWA / WT210	2015-02-06	2016-02-29
UL-PA078	91N114682	Power Analyzer	V:15/30/60/150/300/600(AC/DC) A:5mA/10mA/20mA/50mA/100mA/200mA/ 0.5A/1A/2A/5A/10A/20A(AC/DC) W:Full Range P.F.:Full Range	YOKOGAWA / WT210	2015-02-06	2016-02-29

~~"Chamber setting(s) ☐ was ☐ were monitored to ensure that the setting(s) ☐ was ☐ were stable throughout the test time frame. Any deviations from the setting(s) are noted below.~~

Date	Test	Instrument Code	Time period of deviation	Setting(s)
N/A	N/A	N/A	N/A	N/A

** Information to be recorded when tests are conducted at a non-UL facility.

*** Refer to specific data sheet for individual scale used.

☒ Test equipment information is recorded on UL's Laboratory Project Management (LPM)/Laboratory Equipment Management (LEM) database. (This statement may be selected only if datasheets are completed at a UL facility)

POWER SUPPLY REFERENCE PAGE

Product Name/Type:	External AC/DC Power Supply (EPS)
Manufacturer:	MEAN WELL ENTERPRISES CO., LTD.
Brand Name:	
Model Number/Designation:	GST36B24
Existing Roman Numeral Marking, if marked (i.e. III, IV, V)	VI

Nameplate Rating:	Input:	100-240VAC, 50/60HZ, 0.8A
	Output:	24Vdc, 1.5A

Each sample was tested at:	☒ 230V, 50Hz		
UUT Output Cord Length (± 1 cm):	100		
Presence of Input Power Switch (Y/N):	☐ Yes	☒ No	
Input Power Switch (ON/OFF):	☐ ON	☐ OFF	☒ N/A
UUT is a Standard/Low Voltage Type:	☒ Standard	☐ Low Voltage	☐ N/A
End Product Powered by the UUT:	N/A		

Notes/Comments: N/A

TECHNICIAN'S REFERENCE PAGE

DEFINITIONS

“UUT”: UUT is any acronym for “Unit Under Test”

“Low Voltage External Power Supply”: An external power supply (EPS) with a nameplate output voltage of less than 6 volts and a nameplate output current greater than or equal to 550 milliamperes.

“Active Mode”: The condition in which the input of a power supply is connected to line voltage ac and the output is connected to an ac or a dc load drawing a fraction of the power supply's nameplate power output greater than zero.

“Active Mode Efficiency”: The ratio, expressed as a percentage, of the total active output power (ac or dc) produced by a power supply to the active input power (ac) required to produce the total active output power.

“No-Load Mode”: The condition in which the input of a power supply is connected to an ac source consistent with the power supply's nameplate ac voltage, but the output is not connected to a product or any other load.

“Power Factor (True)”: The true power factor is the ratio of the active or real power (P) consumed in watts to the apparent power (S), drawn in volt-amperes (VA).

$$PF = P/S$$

POWER MEASUREMENTS

All power figures should be in watts and rounded to the second decimal place. For loads greater than or equal to 10 W, three significant figures shall be reported.

INPUT METER CONSIDERATIONS

The power measurement instrument shall have a resolution of:

- 0.01 W or better for power measurements of 10 W or less;
- 0.1 W or better for power measurements of greater than 10 W up to 100 W; and
- 1 W or better for power measurements of greater than 100 W.

The following attributes in addition to those above are suggested for the input power meter:

- Frequency response of at least 3 kHz.

TECHNICIAN'S REFERENCE PAGE (Cont'd)

INSTRUCTIONS – TEST PREPARATION AND LOADING

“Built-in switch”: if a built-in switch in the UUT control power flow to the ac input, it shall be ON position for measurement.

“Output Cord”: the UUT must be tested with the output cord supplied by the manufacturer.

Metering equipment shall be connected to the output of the power supply by:

- Cutting the cord immediately adjacent to the output connector
- Attaching leads and measuring the efficiency from the output connector itself

Where the UUT is directly connected to the end product that it is powering, the cord immediately adjacent to the powered product shall be cut and output measurement probes shall be connected at that point.

“UUT with more than 2 output wires”: in similar cases, the tests shall be conducted on two output wires that supply power to the product. The other output wires (i.e.: used for battery monitoring) shall be left disconnected.

“UUT with switchable output”: in similar cases, the UUT shall be tested for each output voltage, one at a time.

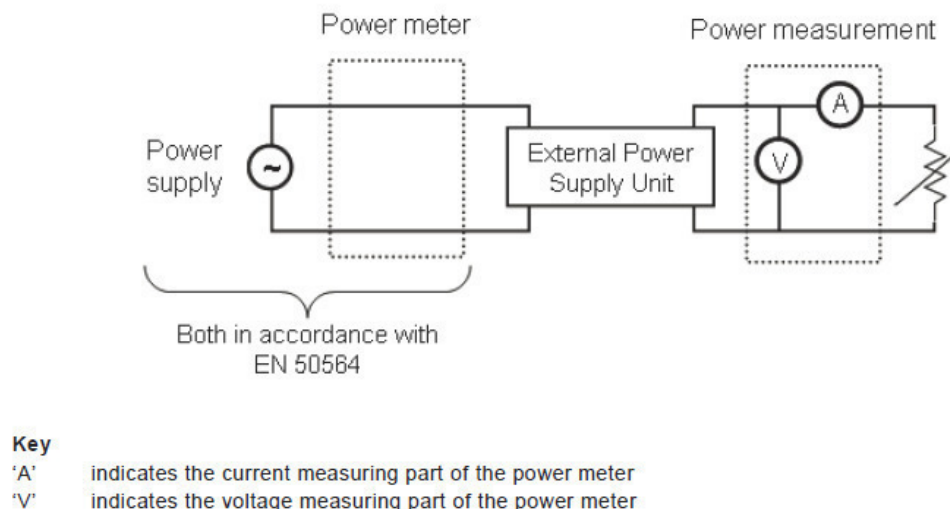
“Loading”: A set of variable Resistive or Electronics Loads shall be used to load the power supply to produce the four active-mode load conditions specified in Table 1 (Load Conditions 1 to 4). While this load may differ from the electronic loads that EPS are designed to power, they provide standardized and repeatable references for testing and product comparison.

When an Electronic Load is used for the output loading, the desired output current should be adjusted in constant current (CC) mode rather than adjusting the required output power in constant power (CP) mode.

When a Resistive Load is used, it needs to be measured precisely with an ohmmeter, a variable resistor may be adjusted to the point where an ammeter confirms that the desired percentage of nameplate output current is flowing through the load.

Figure A1 shows an external power supply test set-up using a variable resistance as the load.

Figure A1 – Generic test set-up using a variable resistive load



ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:**TESTING SEQUENCE:**

The UUT shall be tested at each load condition specified in Table 1, testing consecutively from Load Condition 1 (100% Load) to Load Condition 5 (No-Load).

The UUT shall be operated at 100% of nameplate current output (Table 1: Load Conditions 1) for at least 30 minutes warm-up period then immediately prior to conducting efficiency measurements

After warm-up period, the technician shall monitor AC input power for a period of 5 minutes to assess the stability of the UUT.

1. If the power level does not change by more than 5% from the maximum value observed, the UUT can be considered stable and the indicated measurements can be recorded at the end of the 5 minute period.
2. If ac input power is not stable over a 5 minute period, stability shall be determined in accordance with EN 50564:2011, clause 5.3.(Note: EN50564:2011, 5.3.1 – Sampling Method)

Note: If load condition 1 cannot be maintained for the warm-up period or the stability period then compliance with this standard cannot be determined.

While the unit operates under each of the subsequent Load Conditions from 2 to 5 (See Table 1) for a period of time not necessary to repeat warm-up period, the technician shall record all the indicated measurements for each Load Condition, as indicated as above item 1 or 2

Table 1 – Load Conditions and testing sequence

Load Conditions for UUT	Percentage of Nameplate Output Current	Warm-up period by Load Conditions [minutes]	Assessment period after warm-up [minutes]
1	100% $\pm$ 2% ⁽¹⁾	30	5
2	75% $\pm$ 2%	0	5
3	50% $\pm$ 2%	0	5
4	25% $\pm$ 2%	0	5
5	0%	0	5
Note(s): ⁽¹⁾ The 2% allowance is of nameplate output current, not of the calculated current value. For example, a UUT at Load Condition 3 may be tested in a range from 48% (min) to 52% (max) of rated output current.			

EN50564-2011: Clause 5.3.1 – Sampling Method

Where the power consumption within a mode is not cyclic, the average power is assessed as follows:

1. The product shall be energized for not less than 15 min; this is the total period;
2. Any data from the first one third of the total period is always discarded. Data recorded in the second two thirds of the total period is used to determine stability;
3. Establishment of stability depends on the average power recorded in the second two thirds of the total period. For input powers less than or equal to 1 W, stability is established when a linear regression through all power readings for the second two thirds of the total period has a slope of less than 10 mW/h. For input powers of more than 1 W, stability is established when a linear regression through all power readings for the second two thirds of the total period has a slope of less than 1 % of the measured input power per hour.
4. Where a total period of 15 min does not result in the above stability criteria being satisfied, the total period is continuously extended until the relevant criteria above is achieved (in the second two thirds of the total period).
5. Once stability is achieved, the result is taken to be the average power consumed during the second two thirds of the total period.

NOTE: If stability cannot be achieved within a total period of 3 h, the raw data should be assessed to see whether there is any periodic or cyclic pattern present.

Where the power consumption within a mode is cyclic (i.e. a regular sequence of power states that occur over several minutes or hours), the average power over a minimum of four complete cycles is assessed as follows:

1. The product shall be energized for an initial operation period of not less than 10 min. Data during this period is not used to assess the power consumption of the product;
2. The product is then energized for a time sufficient to encompass two comparison periods, where each period shall include not less than two cycles and have a duration of not less than 10 min (comparison periods must contain the same number of cycles);
3. Calculate the average power for each comparison period;
4. Calculate the mid-point in time of each comparison period in hours;
5. Stability is established where the power difference between the two comparison periods divided by the time difference of the mid-points of the comparison periods has a slope of less than
 - 10 mW/h, for products where the input powers is less than or equal to 1 W; or
 - 1 % of the measured input power per hour, for products where the input powers is greater than 1 W
6. Where the above stability criteria is not satisfied, additional cycles are added equally to each comparison period until the relevant criteria above is achieved
7. Once stability is achieved, the power is determined as the average of all readings from both comparison periods.

Note: Where cycles are not stable or are irregular, sufficient data shall be measured to adequately characterize the power consumption of the **mode** (a minimum of 10 cycles is recommended).

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-11-06
signature print
Sample #: 0919001-1 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS: (Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 1
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 1.5

	External Power Supply Input Electric Data										Power Supply [DC] Output		
Load #	V	HZ	A	PF	THD	5 Minutes Stability Assessment %	*Stability value from Sampling or average power method if UUT failed 5 minute stability assessment	**Avg. Power (W)	Uncertainty of the equipment (Ue)	Interval [min]	V	A	**Avg. Power (W)
1 (100%)	229.58	50.00	0.411	0.42	0.25	0.05	--	40.0332	*	5	24.05	1.50	36.1560
2 (75%)	229.59	50.00	0.323	0.40	0.23	0.07	--	30.0888	*	5	24.07	1.12	27.1080
3 (50%)	229.62	50.00	0.221	0.39	0.20	0.10	--	19.9392	*	5	24.07	0.75	18.0564
4 (25%)	229.63	50.00	0.117	0.37	0.17	0.10	--	9.9660	*	5	24.06	0.37	9.0084
5 (0%)	229.66	50.00	0.036	0.00	0.14	49.88	0.00000244	0.0398	*	10			

Efficiency of Power Supply					Power Consumed by UUT (W)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4	100%	75%	50%	25%	No Load
90.315	90.09332	90.557	90.39133	90.33924674	3.8772	2.9808	1.8828	0.9576	0.0398

The calculated measurement uncertainty(Ue) shall be checked out under 0%, 25%, 50%, 75% and 100% load conditions, results ☒comply ☐do not comply with the requirement addressed in EN50563/EN50564 (Annex D):

- Input Power, the result shall be less than 2% for powers of 0.5 W or greater, or 10 mW for powers of less than 0.5W
- Output Power, the result shall be less than 2% for powers of 1 W or greater, or 0.02W for powers of less than 1W

*Ue=0.36 % value addressed in uncertainly measurement report

Ue Calculation Notes: _____

WORKSHEETS (CONT'D)

EU Directive for Energy-related Products 2009/125/EC and Implementing Measure no. EC 278/2009 for External Power Supply

Table 2: Energy-Efficiency Criteria for AC-AC and AC-DC External Power Supplies in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum Average Efficiency in Active Mode (expressed as a decimal)
0 to ≤ 1 Watt	$\geq 0.480 * P_o + 0.140$
> 1 to ≤ 51 Watts	$\geq [0.063 * \ln(P_o)] + 0.622$
> 51 Watts	≥ 0.870
Note: All efficiency values shall be rounded to the hundredths place.	

Table 3: Energy-Efficiency Criteria for AC-AC and AC-DC External Power Supplies in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum Average Efficiency in Active Mode (expressed as a decimal)
0 to ≤ 1 Watt	$\geq 0.497 * P_o + 0.067$
> 1 to ≤ 51 Watts	$\geq [0.0750 * \ln(P_o)] + 0.561$
> 51 Watts	≥ 0.860
Note: All efficiency values shall be rounded to the hundredths place.	

☒ Base on Tables 2 & 3, the calculated Minimum Average Efficiency in Active Mode is: 0.848 (84.8 %)

☒ The measured Minimum Average Efficiency in Active Mode is the following:

Model:	GST36B24		
Nameplate Output:	24VDC, 1.5A		
Minimum Average Efficiency in Active Mode	Sample No.:	0919001-1	
	Input Voltage:	230V, 50Hz	
	Efficiency :	0.903 (90.3 %)	

Table 4: Power Consumption Criteria for No-Load

Nameplate Output Power (P_{no})	Maximum Power in No-Load		
	Ac-Ac EPS	Ac-Dc EPS	Low Voltage EPS
0 to < 51 watts	≤ 0.5 watts	≤ 0.3 watts	≤ 0.3 watts
≥ 51 watts	≤ 0.5 watts	≤ 0.5 watts	n/a

☒ The measured Maximum Power In No-Load Condition is the following:

Model:	GST36B24		
Nameplate Output:	24VDC, 1.5A		
Maximum Power In No-Load Condition	Sample No.:	0919001-1	
	Input Voltage:	230V, 50Hz	
	Power :	0.039 W	

 UUT ☒ complies ☐ does not comply with requirements in:

EU Directive for Energy-related Products 2009/125/EC and Implementing Measure no. EC278/2009 for External Power Supply



ENERGY EFFICIENCY CERTIFICATION (EEC): Test Report - Cover Page

Customer Name: Mean Well Enterprises Co., Ltd.

Address: No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 24891 Taiwan

Brand Name(s):



Model Number(s): GST36B48, GST36U48, GST36E48

Product Category: EXTERNAL POWER SUPPLY

Representative (tested) Model: GST36B48

Model Differences: All models are identical except for model designation

The sample(s) tested is(are) compliant with the following applied standards/regulations:

NRCAN: Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II

US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609

US DoE: Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430

EU Directive for Energy-related Products ErP 2009/125/EC and Implementing Measure (IM) no. EC278/2009 for External Power Supply

Australian (Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014) and New Zealand (Minimum energy performance standards)

EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5

Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances

Test Location Name: MEAN WELL ENTERPRISES CO., LTD.

Test Location Address: 28 WUQUAN 3RD RD, WUGU DISTRICT, NEW TAIPEI, 248, TAIWAN

Testing Performed Under: ☐ UL Lab ☐ Private Label
☐ CTDP/SMTL ☒ WMTL ☐ EPA 3rd Party

UL Project No.: 4786997669 BA5, 4788995393-e

Project Handler: Hans Chen

Issued: 2015-11-30
(yyyy-mm-dd)

Reviewed by: Evy Chang / Jasmin Wang

Revised: 2019-08-02
(yyyy-mm-dd)

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ATTACHMENT(S)

- Results Summary of International Efficiency Marking Protocol.
- Model(s) GST36B48, GST36U48, GST36E48 are Direct Operation, AC-DC, Low-Voltage type EPS.

Test	Result	Compliant, Y/N
The roman numeral mark of International efficiency marking protocol, if applicable	VI	Yes

Label information:



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Annex A1

Regulatory Body	Test Method, Regulation or Program Evaluated to	Test Limit per Regulation or Program Requirement		Measurements		Other
		Average Efficiency In Active Mode	No-Load Mode Power	Average Efficiency In Active Mode	No-Load Mode Power	
NRCan	10 CFR Parts 429 and 430	≥ 87.4 %	≤ 0.1 W	*90.81 %	**0.057 W	Complied
DoE	10 CFR Parts 429 and 430	≥ 87.4 %	≤ 0.1 W	*90.81 %	**0.057 W	Level VI
CEC	Appliance Efficiency Regulations, Sections 1601 through 1609	≥ 87.4 %	≤ 0.1 W	*90.81 %	**0.057 W	Complied
ErP	Annex I(b) Of 2009/125/EC and Commission Regulation (EC) No 278/2009	≥ 84.8 %	≤ 0.3 W	91.16 %	0.0556 W	Complied
Australian (GEMS) and New Zealand	AS/NZS4665.1-2005+A1:2009; AS/NZS4665.2-2005+A1:2009	≥ 84.6 %	≤ 0.3 W	91.08 %	0.0504 W	'High efficiency' performance mark V; Mark VI mentioned in the IEMP
CoC	Energy Efficiency of External Power Supplies Version 5	≥ 88.3 % ≥ 78.3 % @10% load	≤ 0.075 W	91.08 % 87.52%	0.060 W	Complied
Quebec	10 CFR Parts 429 and 430	≥ 87.4 %	≤ 0.1 W	*90.81 %	**0.057 W	Complied

Additional Information:

See Energy Efficiency Laboratory Data Package of Project No: 4786997669 BA5 for further details and test results.

N/A = Not Applicable

* According to 10 CFR SUBPART B of PART 429.37 sampling plan for Active Mode:

LCL/0.95=95.517, Mean=90.870, n=3, 87.4 ≤ certified rating ≤ 90.870 (%), Certified rating is for registration purpose.

** According to 10 CFR SUBPART B of PART 429.37 sampling plan for No-Load Mode:

UCL/1.05=0.0560, Mean=0.0464, n=3, 0.1 W ≥ certified rating ≥ 0.0560 W, Certified rating is for registration purpose.

Project History:

For Project 4788995393-e:

1). Update regulations from NRCan: Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II to NRCan: Amendment 14 to the Energy Efficiency Regulations for External Power Supplies in the Canada Gazette, Part II.

2). Update regulations from US CEC: Appliance Efficiency Regulations (California Code of Regulations, Title 20, Sections 1601 through 1608) dated July 2015 to US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609.

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- 3). Update regulations from Australian (GEMS) and New Zealand : AS/NZS4665.1-2005+A1:2009 ; AS/NZS4665.2-2005+A1:2009 to Australian (Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014) and New Zealand (Minimum energy performance standards).
 - 4). Update regulation from EU Code of Conduct on Energy Efficiency of External Power Supplies, Version 5 to EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5.
 - 5). Adding regulations Quebec: Regulation respecting the energy efficiency of electrical or hydrocarbon-fuelled appliances.
 - 6). Update customer information from Mean Well Enterprises Co., Ltd., address No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 248 Taiwan to Mean Well Enterprises Co., Ltd., address No. 28, Wuquan 3rd Rd., Wugu Dist., New Taipei City, 24891 Taiwan.
- Test waived by engineering judgement, due to the test results is complied with Quebec and NRCan energy efficiency regulations.

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DATA PACKAGE INFORMATION SHEET

Applicant Information	Name / Address:	MEAN WELL ENTERPRISES CO., LTD. 28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 248TAIWAN	
-----------------------	-----------------	---	--

Product Information	Standard(s):	☒ "Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies" dated August 11, 2004 International Efficiency Marking Protocol for External Power Supplies	
		☒ NRCan: Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II	
		☒ US CEC: Appliance Efficiency Regulations (California Code of Regulations, Title 20, Sections 1601 through 1608) dated July 2015	
		☒ US DoE: Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430	
		☒ Australian (GEMS) and New Zealand : AS/NZS4665.1-2005+A1:2009; AS/NZS4665.2-2005+A1:2009	
		☒ EU: Code of Conduct on Energy Efficiency of External Power Supplies Version 5	
		☒ Mexico: Secretaría de Energía, Director General de la Comisión Nacional para el Uso Eficiente de la - Catálogo de equipos y aparatos para los cuales los fabricantes, importadores, distribuidores y comercializadores deberán incluir información sobre su consumo energético	
		☐ Other:	
	CCNs:	ENVP	
	Product Name/Type:	External Power Supply ☒ AC-DC ☐ AC-AC	
	Model(s):	GST36B48	

Test Location Information	DAP and UL: ☐ CTDTP ☐ TCP ☐ TPTDP ☒ WTDP ☐ UL		
	Test Location Name/Address: MEAN WELL ENTERPRISES CO., LTD. 28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 248TAIWAN		
	Tests Conducted By**:	Sign	Frank Lin
		Print	Frank Lin
	**When all tests are conducted by one person, the printed name and signature can be inserted here instead of on each page containing data.		
	Authorized Signatory or TCP Reviewer:	Sign	--
		Print	--
		Date	--
	UL WTDP / WMT Witness:	Sign	--
		Print	--

Reviewed & Accepted	Qualified Project Handler:	Sign	Nat Liu/ Amos Chen
		Print	Nat Liu/ Amos Chen

LIST OF TESTS

<u>Test Name</u>	<u>Page</u>
ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:.....	9
ACTIVE MODE POWER CONSUMPTION TEST at 10% LOADING:.....	17
ACTIVEMODE POWER CONSUMPTION TEST at 10% LOADING (Mandatory for CoC, Optional for other than CoC): ..	18
WORKSHEETS.....	19

Special Instructions:

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

Standard	Ambient Temperature °C	Relative Humidity RH %	Supply Voltage Tolerance%	Total Harmonic Distortion THD %	Airspeed, room m/s	Supply Frequency Tolerance %
--	23±5	10-80	±1	<2	≤0.5	±1

NOTE:

The input voltage source shall be capable of delivering at least 10 times the nameplate input power of the UUT (as is specified in IEEE 1515-2000).

Witness Test Data Program (WTDP) Information:**Environment:**

Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025 Clause 5.3.1, 5.3.2, 5.3.3)

☒ Yes ☐ No ☐ N/A

Equipment:

Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025 5.6.2.2)

☒ Yes ☐ No

Critical Consumables:

Critical consumables are compliant with test standard requirements. (ISO/IEC 17025 Clause 4.6)

☐ Yes ☐ No ☒ N/A

Sample Identification:

Identification of items to be tested has been made (e.g. model no., Serial No., etc.) (See Test Sample Identification page and ISO/IEC 17025 Clause 5.8.2)

☒ Yes ☐ No

Summary:

The test facility was deemed to have the environment and capabilities necessary to perform the tests included in this data package.

☒ Yes ☐ No

POWER SUPPLY REFERENCE PAGE (ENGINEERING TO COMPLETE)

Product Name/Type:	External AC/DC Power Supply (EPS)	
Manufacturer:	MEAN WELL ENTERPRISES CO., LTD.	
Brand Name:		
Model Number/Designation:	GST36B48	
Model differences:	N/A	
Class A External Power supply	☒ Yes ☐ No	
External Power Supply Product Class ID	☒ B	Direct Operation, AC-DC, Basic-Voltage
	☐ C	Direct Operation, AC-DC, Low-Voltage (except those with nameplate output voltage less than 3 volts and nameplate output current greater than or equal to 1,000 milliamps that charge the battery of a product that is fully or primarily motor operated)
	☐ D	Direct Operation, AC-AC, Basic-Voltage
	☐ E	Direct Operation, AC-AC, Low-Voltage
	☐ H	Direct Operation, High-Power
	☐ N	Indirect Operation

Nameplate Rating:	Input:	100-240VAC, 50/60HZ, 0.8A
	Output:	48Vdc, 0.75A

Each sample was tested at:	☐ 115V, 60Hz	☐ 230V, 50Hz	☒ Both
UUT Output Cord Length (± 1 cm):	100		
UUT is a Replacement EPS:	☐ Yes	☒ No	☐ N/A
Presence of Input Power Switch (Y/N):	☐ Yes	☒ No	
Input Power Switch (ON/OFF):	☐ ON	☐ OFF	☒ N/A
End Product Powered by the UUT:	N/A		

Notes/Comments:
☒ For Mexico EE - Las pruebas realizadas en 115/230 Vaca consideradas representativas al 127/220 Vac. (Tests performed on 115/230 Vac were considered representative to 127/220 Vac.)

TECHNICIAN'S REFERENCE PAGE

DEFINITIONS

“UUT”: UUT is any acronym for “Unit Under Test”

“Low Voltage External Power Supply”: An external power supply (EPS) with a nameplate output voltage of less than 6 volts and a nameplate output current greater than or equal to 550 milliamperes.

“Active Mode”: The condition in which the input of a power supply is connected to line voltage ac and the output is connected to an ac or a dc load drawing a fraction of the power supply's nameplate power output greater than zero.

“Active Mode Efficiency”: The ratio, expressed as a percentage, of the total active output power (ac or dc) produced by a power supply to the active input power (ac) required to produce the total active output power.

“No-Load Mode”: The condition in which the input of a power supply is connected to an ac source consistent with the power supply's nameplate ac voltage, but the output is not connected to a product or any other load.

“Power Factor (True)”: The true power factor is the ratio of the active or real power (P) consumed in watts to the apparent power (S), drawn in volt-amperes (VA).

$$PF = P/S$$

“Basic-Voltage External Power Supply”: An external power supply is not a low-voltage external power supply.

“Direct Operation External Power Supply”: An external power supply can operate a consumer product that is not a battery charger without the assistance of a battery.

“Indirect Operation External Power Supply”: An external power supply cannot operate a consumer product that is not a battery charger without the assistance of a battery.

POWER MEASUREMENTS

All power figures should be in watts and rounded to the second decimal place. For loads greater than or equal to 10 W, three significant figures shall be reported.

Where the measured power is not stable, average power readings over a user-selected period are used in this case. The test instrument shall record the true average power over a user selected period, the period selected shall not be less than 5 minutes. If the power varies over a cycle, the period selected to average power shall be one or more complete cycles.

INPUT METER CONSIDERATIONS

The power measurement instrument shall have a resolution of:

- 0.01 W or better for power measurements of 10 W or less;
- 0.1 W or better for power measurements of greater than 10 W up to 100 W; and
- 1 W or better for power measurements of greater than 100 W.

The following attributes in addition to those above are suggested for the input power meter:

- Frequency response of at least 3 kHz.

Power measurement instrument having the ability to average power accurately over any user-selected time interval (this is usually done with an internal math calculation dividing accumulated energy by time within the meter, which is the most accurate approach).

TECHNICIAN'S REFERENCE PAGE (Cont'd)

INSTRUCTIONS – TEST PREPARATION AND LOADING

“Built-in switch”: if a built-in switch in the UUT control power flow to the ac input, it shall be ON position for measurement.

“Output Cord”: the UUT must be tested with the output cord supplied by the manufacturer.

Metering equipment shall be connected to the output of the power supply by:

Cutting the cord immediately adjacent to the output connector

Attaching leads and measuring the efficiency from the output connector itself

Where the UUT is directly connected to the end product that it is powering, the cord immediately adjacent to the powered product shall be cut and output measurement probes shall be connected at that point.

“UUT with more than 2 output wires”: in similar cases, the tests shall be conducted on two output wires that supply power to the product. The other output wires (i.e.: used for battery monitoring) shall be left disconnected.

“UUT with switchable output”: in similar cases, the UUT shall be tested for each output voltage, one at a time.

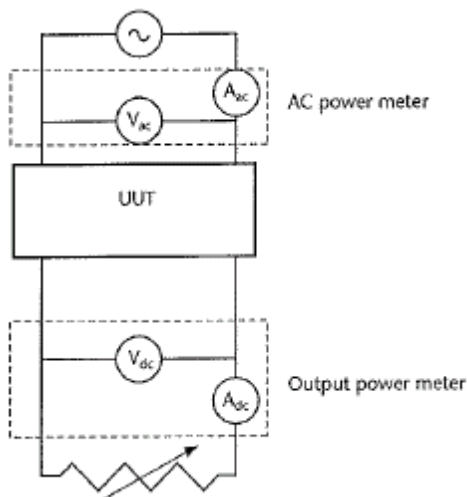
“Loading”: A set of variable Resistive of Electronics Loads shall be used to load the power supply to produce the four active-mode load conditions specified in Table 1 (Load Conditions 1 to 4). While this load may differ from the electronic loads that EPS are designed to power, they provide standardized and repeatable references for testing and product comparison.

When an Electronic Load is used for the output loading, the desired output current should be adjusted in constant current (CC) mode rather than adjusting the required output power in constant power (CP) mode.

When a Resistive Load is used, it needs to be measured precisely with an ohmmeter, a variable resistor may be adjusted to the point where an ammeter confirms that the desired percentage of nameplate output current is flowing through the load.

Figure A1 shows an external power supply test set-up using a variable resistance as the load.

Figure A1 – Generic test set-up using a variable resistive load



Tested by: Frank Lin	Tested by: Frank Lin	Test Date: 2015-10-15
signature	print	
Sample # : 0919001-1 , 0919001-2 ,	Instrument Code / Range:	
0919001-3		

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:

TESTING SEQUENCE:

The UUT shall be tested at each load condition specified in Table 1, testing consecutively from Load Condition 1 (100% Load) to Load Condition 5(No-Load).

The UUT shall be operated at 100% of nameplate current output (Table 1: Load Conditions 1) for at least 30 minutes immediately prior to conducting efficiency measurements.

For Agencies other than NRCan, after the warm-up period, the technician shall monitor AC input power for a period of 5 minutes to assess the stability of the UUT. If the power level does not drift by more than 5% from the maximum value observed, the UUT can be considered stable and the indicated measurements can be recorded at the end of the 5 minute period.

For NRCan, after the warm-up period, the unit shall continue to run in the load condition and the power shall be recorded after using the Accumulated Energy approach outlined in CAN/CSA 62301 clause 5.3.2b for at least 5 minutes.

NOTE: To ensure consistent units, it is recommended that watt-hours and hours be used above, to give watts.

For Agencies other than NRCan, subsequent Load Conditions 2 - 5 (See Table 1) can then be measured under the same 5 minute stability guidelines. Please take note that only for compliance with requirements in NRCan programs and CSA/CAN381.1-08, the UUT shall operate under each of the subsequent active/no-load mode conditions (Table 1: Load Conditions 2 to 5) for a minimum warm-up period of not less than 30 minutes.

While the unit operates under each of the subsequent Load Conditions from 2 to 5 (See Table 1) for a period of time not less than required warm-up period, the technician shall record all the indicated measurements two (2) times for each Load Condition, as indicated below:

1st Measurement (required for all Agencies except NRCan): the technician shall monitor ac input power for a period of 5 minutes to assess the stability of the UUT (See of Table 1, 2 and 3 for details). If the power level does not drift by more than 5% from the maximum value observed, the UUT shall be considered stable and the measurements can be recorded at the end of the 5 minute period. When AC input power is not stable over the 5 minute period, the technician shall follow the guidelines established by IEC62301, Clause 5.3.2 (a) for measuring average power or Clause 5.3.2 (b) for measuring accumulated energy over time for both AC input and DC output⁽¹⁾.

2nd Measurement (required for NRCan only): After the mandatory 30 minutes warm-up period for each of the subsequent Load Conditions (See of Table 1, 2 and 3 for details) the unit shall continue to run in the load condition and the power shall be recorded after using the Accumulated Energy approach outlined in CAN/CSA 62301 clause 5.3.2b for at least 5 minutes.

⁽¹⁾ = IEC62301 and CAN/CSA62301 standards are intended to measure input power, however the methods specified in Clauses 5.3.2 (a) and 5.3.2 (b), may be used to measure Output power for the purposes of this testing.

The sequence mentioned above at items 1 and 2 shall be repeated for each Load Conditions from 2 to 5 in Table 1.

For Australia/New Zealand requirements (AuNZ), if a power supply has only a 240V, 50Hz input, conduct the testing at 240 V, 50Hz input and record the data in the 230V tables for ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST. Indicate on the data tables that testing was conducted at 240V, 50 Hz input.

Tested by: <u>Frank Lin</u> signature	Tested by: <u>Frank Lin</u> print	Test date: <u>2015-10-15</u>
Sample # : <u>0919001-1 , 0919001-2 , 0919001-3</u>	Instrument Code / Range: _____	

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

TESTING SEQUENCE (Cont'd)

The above testing sequence shall be repeated on three (3) units in total of the same UUT.

Table 1 – Load Conditions and testing sequence

Load Conditions for UUT	Percentage of Nameplate Output Current	Warm-up period by Load Conditions [minutes]	Assessment period after warm-up [minutes]	Number of measurement(s) by Load Conditions
1	100% $\pm$ 2% ⁽²⁾	30	5 0 (NRCAN)	1 other Agencies 5 min Accumulated Energy
2	75% $\pm$ 2%	0 (for other agencies)	5	1 for other Agencies
		30 (for NRCAN)	0	5 min Accumulated Energy
3	50% $\pm$ 2%	0 (for other agencies)	5	1 for other Agencies
		30 (for NRCAN)	0	5 min Accumulated Energy
4	25% $\pm$ 2%	0 (for other agencies)	5	1 for other Agencies
		30 (for NRCAN)	0	5 min Accumulated Energy
5	0%	0 (for other agencies)	5	1 for other Agencies
		30 (for NRCAN)	0	5 min Accumulated Energy

Note(s):

- ⁽²⁾The 2% allowance is of nameplate output current, not of the calculated current value.
- For example, a UUT at Load Condition 3 may be tested in a range from 48% (min) to 52% (max) of rated output current.
- It is mandatory for CoC. The UUT shall be considered 10% $\pm$ 2% of nameplate output current after load condition 4, warm up period is 0 minute and 5 minutes is for assessment period, and then continue condition 5.

Comments:

- If test has not been performed in accordance with requirements in NRCAN: Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II; technician shall fill all cells related to NRCAN results with “-” or leave them “blank”.
- If test has been performed in accordance with requirements in NRCAN program only, technician shall fill all cells related to results for all other Agencies other than NRCAN with “-” or leave them “blank”.
- If instantaneous power measurement is acceptable, technician record the instantaneous power measurement under the column “***Avg. Power (W)” and then shall fill cells of columns “Wh” and “Wh Interval” with “-” or leave them “blank”.

Tested by: Frank Lin Tested by: Frank Lin Test date: 2015-10-15
signature print
Sample #: 0919001-1 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:(Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 1
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 0.75

External Power Supply Input Electric Data											Power Supply [DC] Output			
Load #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	114.73	60.00	0.628	0.56	0.21	3.3426	40.1112	5	30 (All)	0.05	48.15	0.75	3.0058	36.0696
2 (75%)	114.76	60.00	0.483	0.53	0.19	2.4538	29.4456	5	0 (others)	0.10	48.10	0.55	2.2232	26.6784
	114.76	60.00	0.483	0.53	0.19	2.4538	29.4456	5	30 (NRCan)	0.10	48.10	0.55	2.2232	26.6784
3 (50%)	114.78	60.00	0.344	0.50	0.16	1.6447	19.7364	5	0 (others)	0.07	48.08	0.37	1.4974	17.9688
	114.78	60.00	0.344	0.50	0.16	1.6447	19.7364	5	30 (NRCan)	0.07	48.08	0.37	1.4974	17.9688
4 (25%)	114.80	60.00	0.181	0.45	0.13	0.7772	9.3264	5	0 (others)	0.12	48.08	0.18	0.7125	8.5500
	114.80	60.00	0.181	0.45	0.13	0.7772	9.3264	5	30 (NRCan)	0.12	48.08	0.18	0.7125	8.5500
5 (0%)	114.82	60.00	0.013	0.03	0.13	0.0040	0.0480	5	0 (others)	20.72				
	114.82	60.00	0.013	0.03	0.13	0.0040	0.0480	5	30 (NRCan)	20.72				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)					NRCan - Average results Efficiency of Power Supply (after 30 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4	100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
89.924	90.60233	91.04396	91.67524	90.81138654	89.92401	90.60233	91.04396	91.6752445	90.81138654

Other than NRCan - Power Consumed by UUT (W)					NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load	100%	75%	50%	25%	No Load
4.0416	2.7672	1.7676	0.7764	0.0480	4.0416	2.7672	1.7676	0.7764	0.0480

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test date: 2015-10-15
signature print
Sample #: 0919001-2 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 2
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 0.75

External Power Supply Input Electric Data											Power Supply [DC] Output			
Load #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	114.73	60.00	0.625	0.56	0.18	3.3545	40.2540	5	30 (All)	0.05	48.13	0.75	3.0136	36.1632
2 (75%)	114.76	60.00	0.480	0.53	0.16	2.4608	29.5296	5	0 (others)	0.07	48.20	0.55	2.2283	26.7396
3 (50%)	114.78	60.00	0.341	0.50	0.13	1.6409	19.6908	5	30 (NRCan)	0.07	48.20	0.55	2.2283	26.7396
4 (25%)	114.78	60.00	0.341	0.50	0.13	1.6409	19.6908	5	0 (others)	0.11	48.17	0.37	1.5040	18.0480
5 (0%)	114.80	60.00	0.182	0.45	0.13	0.7835	9.4020	5	30 (NRCan)	0.11	48.17	0.37	1.5040	18.0480
	114.80	60.00	0.182	0.45	0.13	0.7835	9.4020	5	0 (others)	0.15	48.16	0.18	0.7176	8.6112
	114.81	60.00	0.014	0.04	0.13	0.0042	0.0504	5	30 (NRCan)	0.15	48.16	0.18	0.7176	8.6112
	114.81	60.00	0.014	0.04	0.13	0.0042	0.0504	5	0 (others)	19.84				
	114.81	60.00	0.014	0.04	0.13	0.0042	0.0504	5	30 (NRCan)	19.84				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)					NRCan - Average results Efficiency of Power Supply (after 30 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4	100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
89.838	90.55185	91.65702	91.58902	90.90885646	89.83753	90.55185	91.65702	91.5890236	90.90885646

Other than NRCan - Power Consumed by UUT (W)					NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load	100%	75%	50%	25%	No Load
4.0908	2.79	1.6428	0.7908	0.0504	4.0908	2.79	1.6428	0.7908	0.0504

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-10-15
signature print
Sample #: 0919001-3 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 3
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 0.75

External Power Supply Input Electric Data											Power Supply [DC] Output			
Load #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	114.73	60.00	0.626	0.56	0.18	3.3406	40.0872	5	30 (All)	0.05	48.17	0.75	3.0031	36.0372
2 (75%)	114.76	60.00	0.480	0.53	0.15	2.4443	29.3316	5	0 (others)	0.03	48.18	0.55	2.2166	26.5992
	114.76	60.00	0.480	0.53	0.15	2.4443	29.3316	5	30 (NRCan)	0.03	48.18	0.55	2.2166	26.5992
3 (50%)	114.78	60.00	0.340	0.50	0.13	1.6319	19.5828	5	0 (others)	0.08	48.16	0.37	1.4936	17.9232
	114.78	60.00	0.340	0.50	0.13	1.6319	19.5828	5	30 (NRCan)	0.08	48.16	0.37	1.4936	17.9232
4 (25%)	114.80	60.00	0.179	0.45	0.12	0.7735	9.2820	5	0 (others)	0.20	48.15	0.18	0.7074	8.4888
	114.80	60.00	0.179	0.45	0.12	0.7735	9.2820	5	30 (NRCan)	0.20	48.15	0.18	0.7074	8.4888
5 (0%)	114.82	60.00	0.015	0.03	0.13	0.0034	0.0408	5	0 (others)	24.61				
	114.82	60.00	0.015	0.03	0.13	0.0034	0.0408	5	30 (NRCan)	24.61				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)					NRCan - Average results Efficiency of Power Supply (after 30 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4	100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
89.897	90.68445	91.52522	91.45443	90.89027949	89.89702	90.68445	91.52522	91.4544279	90.89027949

Other than NRCan - Power Consumed by UUT (W)					NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load	100%	75%	50%	25%	No Load
4.05	2.7324	1.6596	0.7932	0.0408	4.05	2.7324	1.6596	0.7932	0.0408

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-10-15
signature print
Sample # : 0919001-1 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 1
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 0.75

Load #	External Power Supply Input Electric Data							Power Supply [DC] Output						
	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	229.59	50.00	0.410	0.42	0.25	3.3151	39.7812	5	30	0.13	47.89	0.75	2.9891	35.8692
2 (75%)	229.62	50.00	0.314	0.40	0.22	2.4314	29.1768	5	0	0.07	48.10	0.55	2.2242	26.6904
3 (50%)	229.64	50.00	0.217	0.39	0.20	1.6323	19.5876	5	0	0.10	48.09	0.37	1.4983	17.9796
4 (25%)	229.65	50.00	0.110	0.37	0.16	0.7823	9.3876	5	0	0.16	48.08	0.18	0.7137	8.5644
5 (0%)	229.65	50.00	0.019	0.01	0.14	0.0046	0.0552	5	0	18.13				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
90.166	91.47816	91.79072	91.23099	91.16652005

Other than NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load
3.912	2.4864	1.608	0.8232	0.0552

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-10-15
signature print
Sample #: 0919001-2 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 2
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 0.75

Load #	External Power Supply Input Electric Data							Power Supply [DC] Output						
	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	229.60	50.00	0.401	0.44	0.23	3.3428	40.1136	5	30	0.10	48.18	0.75	3.0139	36.1668
2 (75%)	229.62	50.00	0.303	0.42	0.21	2.4357	29.2284	5	0	0.07	48.20	0.55	2.2303	26.7636
3 (50%)	229.63	50.00	0.211	0.41	0.18	1.6403	19.6836	5	0	0.05	48.18	0.37	1.5051	18.0612
4 (25%)	229.65	50.00	0.110	0.37	0.15	0.7867	9.4404	5	0	0.08	48.16	0.18	0.7193	8.6316
5 (0%)	229.67	50.00	0.018	0.01	0.14	0.0050	0.0600	5	0	33.39				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
90.161	91.56711	91.75761	91.43257	91.2295516

Other than NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load
3.9468	2.4648	1.6224	0.8088	0.0600

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-10-15
signature print
Sample #: 0919001-3 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS:(Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 3
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 0.75

Load #	External Power Supply Input Electric Data							Power Supply [DC] Output						
	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1 (100%)	229.60	50.00	0.397	0.44	0.23	3.3192	39.8304	5	30	0.08	48.11	0.75	2.9998	35.9976
2 (75%)	229.63	50.00	0.299	0.43	0.21	2.4444	29.3328	5	0	0.07	48.13	0.55	2.2172	26.6064
3 (50%)	229.63	50.00	0.204	0.41	0.17	1.6207	19.4484	5	0	0.10	48.16	0.37	1.4950	17.9400
4 (25%)	229.65	50.00	0.108	0.38	0.15	0.7791	9.3492	5	0	0.12	48.15	0.18	0.7091	8.5092
5 (0%)	229.66	50.00	0.019	0.01	0.15	0.0042	0.0504	5	0	39.92				

Other than NRCan - Efficiency of Power Supply (after 5 min warm-up)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4
90.377	90.70529	92.24409	91.01527	91.08546274

Other than NRCan - Power Consumed by UUT (W)				
100%	75%	50%	25%	No Load
3.8328	2.7264	1.5084	0.84	0.0504

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test date: 2015-10-15
signature print
Sample # : 0919001-1 , 0919001-2 , 0919001-3 Instrument Code / Range: _____

ACTIVEMODE POWER CONSUMPTION TEST at 10% LOADING:

RESULTS:

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Input Test Voltage (Vac): 115 Input Test Frequency (Hz): 60 Rated Output Current (A): 0.75

	External Power Supply Input Electric Data										Power Supply [AC] [DC] Output			
Sample #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1	114.81	60.00	0.084	0.40	0.13	0.3223	3.8676	5	0	0.16	48.07	0.07	0.2912	3.4944
2	114.81	60.00	0.086	0.40	0.13	0.3271	3.9252	5	0	0.15	48.14	0.07	0.2959	3.5508
3	114.81	60.00	0.083	0.40	0.13	0.3149	3.7788	5	0	0.11	48.15	0.07	0.2862	3.4344

Sample #	Efficiency Value (%)
1	90.351
2	90.462
3	90.886

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

Tested by: Frank Lin Tested by: Frank Lin Test date: 2015-10-15
signature print
Sample # : 0919001-1 , 0919001-2 , 0919001-3 Instrument Code / Range: _____

ACTIVEMODE POWER CONSUMPTION TEST at 10% LOADING (Mandatory for CoC, Optional for other than CoC):

RESULTS:

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 0.75

	External Power Supply Input Electric Data										Power Supply [AC] [DC] Output			
Sample #	V	HZ	A	PF	THD	Wh	**Avg. Power (W)	Wh Interval [min]	Minimum Warm-up time [minutes]	5 Minutes Stability Assessment %	V	A	Wh	**Avg. Power (W)
1	229.65	50.00	0.055	0.32	0.15	0.3333	3.9996	5	0	0.15	48.07	0.07	0.2924	3.5088
2	229.65	50.00	0.057	0.31	0.15	0.3398	4.0776	5	0	0.17	48.15	0.07	0.2974	3.5688
3	229.65	50.00	0.055	0.31	0.15	0.3271	3.9252	5	0	0.20	48.15	0.07	0.2878	3.4536

Sample #	Efficiency Value (%)
1	87.729
2	87.522
3	87.985

** The average power is calculated by the following equation: Avg. Power (Watts) = [Wh X 60 minutes / hours] / Wh Interval (minutes)

WORKSHEETS

The measured is the following:						
Minimum Average Efficiency in Active Mode	Input Voltage (V ac):	☒ 115V, 60Hz ☐ NRCan ☐ Other Then NRCan		☒ 230V, 50Hz	☒ 115/230V, 50/60Hz	☐ Other: V, Hz
	Sample No.:	--	0919001-1	0919001-3	0919001-1	/
	Efficiency (%):	--	90.8	91.0	90.8	/
Minimum 10% Load Average Efficiency in Active Mode	Sample No.:	--	0919001-1	0919001-2	0919001-2	/
	Efficiency (%):	--	90.3	87.5	87.5	/
Maximum Power In No-Load Condition	Sample No.:	--	0919001-2	0919001-2	0919001-2	/
	Power (W) :	--	0.050	0.060	0.060	/
Note: ☐ There are two measurements at 115Vac, 60Hz, due to the test methods is different between NRCan and the other regulations. ☒ For NRCan testing, according to guidance form the letter to CB for EPS testing 4-16-12, the test procedure is following "Test Method for Calculating the Energy Efficiency of Single-Voltage External Ac-Dc and Ac-Ac Power Supplies," August 11,2004, in APPENDIX Z to SUBPART B of PART 430 instead of C381.1-08. The results are more than .8 (>) above the minimum efficiency standard.						

International Efficiency Marking Protocol (IEMP) for External Power Supplies:

Base on Table 2, this EPS is complied with the requirements for level: VI at ☒115V ac; ☒230V ac;
 The calculated Minimum Average Efficiency in Active Mode is:0.874 (87.4%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.100Watt.
☐The true power factor was 0.9 or greater at 100% of rated load when tested at 115V, 60Hz. This requirement applies only to Level V power supplies with input power greater than or equal to 100W at 115V, 60Hz.

Canada NRCan Energy Efficiency Requirements: (at 115V ac, 60Hz)

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is:0.823(82.3%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.5 Watt.
 This ☒complies ☐does not comply with requirements in:
 Amendment 11 to the Energy Efficiency Regulations for External Power Supplies, published on October 12, 2011 in the Canada Gazette, Part II

US DoE and CEC Requirements for Class A external power supply: (at 115V ac, 60Hz)

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is:0.823 (82.3%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.5 Watt.
 This ☒complies ☐ does not comply with requirements in:
☒ **US DoE:** Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430
☒ **US CEC:** Appliance Efficiency Regulations (California Code of Regulations, Title 20, Sections 1601 through

1608), dated May, 2014 (CEC-400-2014-009-CMF)

WORKSHEETS (CONT'D)

US DoE Requirements for Direct operation external power supply: (at 115V ac, 60Hz)

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is:0.874 (87.4%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.100Watt.

This ☒ complies ☐ does not comply with requirements in:

Office of Energy Efficiency and Renewable Energy 10 CFR Parts 429 and 430

Australian and New Zealand: (at 230V ac or 240V ac, 50Hz)

Base on Table 2, the calculated Minimum Average Efficiency in Active Mode is:0.846 (84.6%), and Maximum Energy Consumption in No-Load Mode is not greater than 0.300Watt.

This ☒ complies ☐ does not comply with performance mark ☒III; ☒IV; ☒V requirements in:

Australian Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014 and New Zealand Energy Efficiency (Energy Using Products) Regulations 2002

Note:

For **Australian**, according to Clause 8(1)(b) in Greenhouse and Energy Minimum Standards (External Power Supplies) Determination 2014, if a product exceeds the energy performance requirements for Mark V as mentioned in Appendix A of AS/NZS 4665.1:2005 and meets the performance requirements for Mark VI mentioned in the IEMP then the product may be labelled in accordance with the requirements for:

(i) Mark V mentioned in Appendix A of AS/NZS 4665.1:2005 and sections 4.2 and 5 of AS/NZS 4665.2:2005 (Energy Performance Mark); or (ii) Mark VI mentioned in the IEMP.

European Union (EU) Code of Conduct: (at 230V ac, 50Hz)

Base on Table 3, 4, 5, 6, and 7, the calculated Minimum Average Efficiency in Active Mode is:Tier1 : 0.870(87.0%), Tier2 : 0.883(88.3%), at 10% Load is:Tier1 : 0.770(77.0%), Tier2 : 0.783(78.3%),and Maximum Energy Consumption in No-Load Mode is not greater than Tier1 : 0.150, Tier2 : 0.075Watt.

This ☒ complies ☐ does not comply with ☒ Tier 1 and ☒ Tier 2 requirements for **Code of Conduct on Energy Efficiency of External Power Supplies, Version 5**.

MEXICO CONUEE and PROFECO: Energy Consumption Information

1) Energy consumption by unit of time under normal operating conditions of the equipment or appliance ⁽¹⁾:40.254 Wh. If applicable ⁽²⁾:

2) Consumption of energy in idle mode in unit of time of the equipment or appliance ⁽³⁾:0.060 Wh.

Notes:

(1) This is the consumption under full charge conditions and for a 1 hour period of time. The consumption must be indicated in the following units: kW-h/year, kW-h /month W-h /day.

(2) In accordance with Article 26, section II, of the Regulation of the Law for the Sustainable Use of Energy, if applicable, it must indicate the consumption of energy in idle mode by unit of time. If not applicable, write "not applicable."

(3) This is the passive electric energy consumption, when the appliance or equipment is connected to the electrical power circuit, even when the equipment is off, and not performing its main function. The consumption must be indicated in the following units: kW-h/year, kW-h /month W-h /day.

(4). The energy consumption for a hour (Wh) is calculated by the following equation:

The Maximum Avg. Power (Watts) at 100% load x1 hour (h).

Table 2: International Efficiency Marking Protocol for External Power Supplies;

Mark	Performance Requirements				
	Nameplate Output Power (P_{no}) ²	No-Load Mode Power ³	Nameplate Output Power (P_{no})	Average Efficiency in Active Mode ⁴	Power Factor
I	Used if none of the other criteria are met.				
II	0 to ≤ 10 W	≤ 0.75	0 to < 1 W	≥ 0.39 * P_{no}	Not Applicable
	> 10 to 250 W	≤ 1.0	1 to < 49 W	≥ 0.107 * $\ln(P_{no}) + 0.39$	
			> 49 W	≥ 0.82	
III	0 to < 10 W	≤ 0.5	0 to 1 W	≥ 0.49 * P_{no}	Not Applicable
	10 to 250 W	≤ 0.75	> 1 to 49 W	≥ 0.09 * $\ln(P_{no}) + 0.49$	
			> 49 to 250 W	≥ 0.84	
IV	0 to 250 W	≤ 0.5	0 to < 1 W	≥ 0.5 * P_{no}	Not Applicable
			1 to 51 W	≥ 0.09 * $\ln(P_{no}) + 0.5$	
			> 51 to 250 W	≥ 0.85	
V	0 to < 50 W	AC-DC: ≤ 0.3 AC-AC: ≤ 0.5	0 to ≤ 1 W	Basic Voltage: ≥ 0.480 * P_{no} + 0.140 Low Voltage ⁵ : ≥ 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 W	Basic Voltage: ≥ 0.0626 * $\ln(P_{no})$ + 0.622 Low Voltage: ≥ 0.0750 * $\ln(P_{no})$ + 0.561	
	≥ 50 to ≤ 250 W	≤ 0.5	> 49 to 250 W	Basic Voltage: ≥ 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.				

Table 3: Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum Four Point Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no} + 0.146$	$\geq 0.500 * P_{no} + 0.169$
> 1 to ≤ 49 Watts	$\geq 0.0626 * \ln(P_{no}) + 0.646$	$\geq 0.071 * \ln(P_{no}) - 0.00115 * P_{no} + 0.670$
> 49 to ≤ 250 Watts	≥ 0.890	≥ 0.890
Note: All efficiency values shall be rounded to the hundredths place.		

Table 4: Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum Four Point Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no} + 0.086$	$\geq 0.517 * P_{no} + 0.091$
> 1 to ≤ 49 Watts	$\geq 0.0755 * \ln(P_{no}) + 0.586$	$\geq 0.0834 * \ln(P_{no}) - 0.0011 * P_{no} + 0.609$
> 49 to ≤ 250 Watts	≥ 0.880	≥ 0.880
Note: All efficiency values shall be rounded to the hundredths place.		

Table 5: Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum 10% Load Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no} + 0.046$	$\geq 0.5 * P_{no} + 0.060$
> 1 to ≤ 49 Watts	$\geq 0.0626 * \ln(P_{no}) + 0.546$	$\geq 0.071 * \ln(P_{no}) - 0.00115 * P_{no} + 0.570$
> 49 to ≤ 250 Watts	≥ 0.790	≥ 0.790
Note: All efficiency values shall be rounded to the hundredths place.		

Table 6: Energy-Efficiency Criteria for AC-AC and AC-DC EPS in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum 10% Load Average Efficiency in Active Mode (expressed as a decimal)	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
0.3 to ≤ 1 Watt	$\geq 0.500 * P_{no}$	$\geq 0.517 * P_{no}$
> 1 to ≤ 49 Watts	$\geq 0.072 * \ln(P_{no}) + 0.500$	$\geq 0.0834 * \ln(P_{no}) - 0.00127 * P_{no} + 0.518$
> 49 to ≤ 250 Watts	≥ 0.780	≥ 0.780
Note: All efficiency values shall be rounded to the hundredths place.		

Table 7: Power Consumption Criteria for No-Load

Nameplate Output Power (P_{no})	Maximum Power in No-Load	
	Tier 1 – Jan 1st, 2014	Tier 2 – January 1st, 2016
≥ 0.3 to < 49 Watts	≤ 0.150 watts	≤ 0.075 watts
≥ 49 to < 250 Watts	≤ 0.250 watts	≤ 0.150 watts
Mobile handheld battery driven and < 8 W	≤ 0.075 watts	≤ 0.075 watts

===== END OF DATASHEET PACKAGE. =====

DATA PACKAGE INFORMATION SHEET

Applicant Information	Name / Address:	MEAN WELL ENTERPRISES CO., LTD. 28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 248 TAIWAN
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Product Information:	Standard(s):	☒ EU Directive for Energy-related Products ErP 2009/125/EC and Implementing Measure (IM) no. EC278/2009 for External Power Supply
		☒ EN50563-2011/A1:2013, External a.c. - d.c. and a.c. - a.c. power supplies – Determination of no-load power and average efficiency of active modes
		☒ EN50564-2011, Electrical and electronic household and office equipment - Measurement of low power consumption
		☐ Other:
	CCNs:	ENVP
	Product Name/Type:	External Power Supply ☒ AC-DC ☐ AC-AC
Model(s):	GST36B48	

Test Location Information	DAP and UL: ☐ CTDp ☐ TCP ☐ TPTDP ☒ WTDP ☐ UL	
	Test Location Name/Address: MEAN WELL ENTERPRISES CO., LTD. 28 WUQUAN 3 RD RD, WUGU DISTRICT, NEW TAIPEI, 248 TAIWAN	
	Tests Conducted By**:	Sign Frank Lin
		Print Frank Lin
	**When all tests are conducted by one person, the printed name and signature can be inserted here instead of on each page containing data.	
	Authorized Signatory or TCP Reviewer:	Sign --
		Print --
		Date --
	UL WTDP / WMT Witness:	Sign --
Print --		

Reviewed & Accepted	Qualified Project Handler:	Sign Nat Liu/ Amos Chen
		Print Nat Liu/ Amos Chen

LIST OF TESTS**Test Name****Page**

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TECHNICIAN'S REFERENCE PAGE.....	7
ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:.....	11
WORKSHEETS.....	12

Special Instructions:

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

Standard	Ambient Temperature °C	Relative Humidity RH %	Supply Voltage Tolerance%	Total Harmonic Distortion THD %	Airspeed, room m/s	Supply Frequency Tolerance %
--	23±5	10-80	±1	<2	≤0.5	±1

Per test standard EN50564, sub-clause 4.2, Where the product has an ambient light sensor that affects the power consumption, the test shall be carried out with controlled ambient light conditions. Where the illuminance levels are externally defined (in a test procedure or in the instructions for use), these values shall be used. Where no illuminance levels are stated or defined, reference illuminance levels of more than 300 lux and less than 10 lux shall be used.

Witness Test Data Program (WTDP) Information:**Environment:**

Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025 Clause 5.3.1, 5.3.2, 5.3.3)

☒ Yes ☐ No ☐ N/A

Equipment:

Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025 5.6.2.2)

☒ Yes ☐ No

Critical Consumables:

Critical consumables are compliant with test standard requirements. (ISO/IEC 17025 Clause 4.6)

☐ Yes ☐ No ☒ N/A

Sample Identification:

Identification of items to be tested has been made (e.g. model no., Serial No., etc.) (See Test Sample Identification page and ISO/IEC 17025 Clause 5.8.2)

☒ Yes ☐ No

Summary:

The test facility was deemed to have the environment and capabilities necessary to perform the tests included in this data package.

☒ Yes ☐ No

TEST SAMPLE IDENTIFICATION

The table below is to provide correlation of sample numbers to specific product related information. Refer to this table when a test identifies a test sample by "Sample No." only.

Sample Number	Sample Card Number	Date Received	Manufacturer, Product Identification and Ratings
1015001-1	1015001	2015-07-21	Mean Well, External Power Supply, GST36B48 I/P:100-240VAC, 50/60HZ, 0.8A; O/P:48Vdc, 0.75A, 36W Max.
1015001-2	1015001	2015-07-21	Mean Well, External Power Supply, GST36B48 I/P:100-240VAC, 50/60HZ, 0.8A; O/P:48Vdc, 0.75A, 36W Max.
1015001-3	1015001	2015-07-21	Mean Well, External Power Supply, GST36B48 I/P:100-240VAC, 50/60HZ, 0.8A; O/P:48Vdc, 0.75A, 36W Max.
Sampling Procedure (if used) :		--	

POWER SUPPLY REFERENCE PAGE

Product Name/Type:	External AC/DC Power Supply (EPS)
Manufacturer:	MEAN WELL ENTERPRISES CO., LTD.
Brand Name:	
Model Number/Designation:	GST36B48
Existing Roman Numeral Marking, if marked (i.e. III, IV, V)	VI

Nameplate Rating:	Input:	100-240VAC, 50/60HZ, 0.8A
	Output:	48Vdc, 0.75A

Each sample was tested at:	☒ 230V, 50Hz		
UUT Output Cord Length (± 1 cm):	100		
Presence of Input Power Switch (Y/N):	☐ Yes	☒ No	
Input Power Switch (ON/OFF):	☐ ON	☐ OFF	☒ N/A
UUT is a Standard/Low Voltage Type:	☒ Standard	☐ Low Voltage	☐ N/A
End Product Powered by the UUT:	N/A		

Notes/Comments:

TECHNICIAN'S REFERENCE PAGE

DEFINITIONS

“UUT”: UUT is any acronym for “Unit Under Test”

“Low Voltage External Power Supply”: An external power supply (EPS) with a nameplate output voltage of less than 6 volts and a nameplate output current greater than or equal to 550 milliamps.

“Active Mode”: The condition in which the input of a power supply is connected to line voltage ac and the output is connected to an ac or a dc load drawing a fraction of the power supply's nameplate power output greater than zero.

“Active Mode Efficiency”: The ratio, expressed as a percentage, of the total active output power (ac or dc) produced by a power supply to the active input power (ac) required to produce the total active output power.

“No-Load Mode”: The condition in which the input of a power supply is connected to an ac source consistent with the power supply's nameplate ac voltage, but the output is not connected to a product or any other load.

“Power Factor (True)”: The true power factor is the ratio of the active or real power (P) consumed in watts to the apparent power (S), drawn in volt-amperes (VA).

$$PF = P/S$$

POWER MEASUREMENTS

All power figures should be in watts and rounded to the second decimal place. For loads greater than or equal to 10 W, three significant figures shall be reported.

INPUT METER CONSIDERATIONS

The power measurement instrument shall have a resolution of:

- 0.01 W or better for power measurements of 10 W or less;
- 0.1 W or better for power measurements of greater than 10 W up to 100 W; and
- 1 W or better for power measurements of greater than 100 W.

The following attributes in addition to those above are suggested for the input power meter:

- Frequency response of at least 3 kHz.

TECHNICIAN'S REFERENCE PAGE (Cont'd)

INSTRUCTIONS – TEST PREPARATION AND LOADING

“Built-in switch”: if a built-in switch in the UUT control power flow to the ac input, it shall be ON position for measurement.

“Output Cord”: the UUT must be tested with the output cord supplied by the manufacturer.

Metering equipment shall be connected to the output of the power supply by:

- Cutting the cord immediately adjacent to the output connector
- Attaching leads and measuring the efficiency from the output connector itself

Where the UUT is directly connected to the end product that it is powering, the cord immediately adjacent to the powered product shall be cut and output measurement probes shall be connected at that point.

“UUT with more than 2 output wires”: in similar cases, the tests shall be conducted on two output wires that supply power to the product. The other output wires (i.e.: used for battery monitoring) shall be left disconnected.

“UUT with switchable output”: in similar cases, the UUT shall be tested for each output voltage, one at a time.

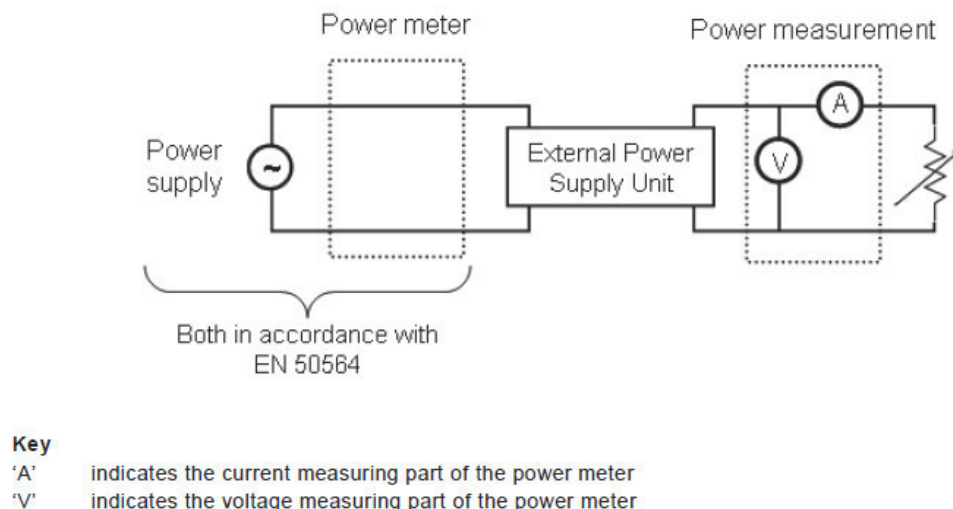
“Loading”: A set of variable Resistive of Electronics Loads shall be used to load the power supply to produce the four active-mode load conditions specified in Table 1 (Load Conditions 1 to 4). While this load may differ from the electronic loads that EPS are designed to power, they provide standardized and repeatable references for testing and product comparison.

When an Electronic Load is used for the output loading, the desired output current should be adjusted in constant current (CC) mode rather than adjusting the required output power in constant power (CP) mode.

When a Resistive Load is used, it needs to be measured precisely with an ohmmeter, a variable resistor may be adjusted to the point where an ammeter confirms that the desired percentage of nameplate output current is flowing through the load.

Figure A1 shows an external power supply test set-up using a variable resistance as the load.

Figure A1 – Generic test set-up using a variable resistive load



ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST:**TESTING SEQUENCE:**

The UUT shall be tested at each load condition specified in Table 1, testing consecutively from Load Condition 1 (100% Load) to Load Condition 5 (No-Load).

The UUT shall be operated at 100% of nameplate current output (Table 1: Load Conditions 1) for at least 30 minutes warm-up period then immediately prior to conducting efficiency measurements

After warm-up period, the technician shall monitor AC input power for a period of 5 minutes to assess the stability of the UUT.

1. If the power level does not change by more than 5% from the maximum value observed, the UUT can be considered stable and the indicated measurements can be recorded at the end of the 5 minute period.
2. If ac input power is not stable over a 5 minute period, stability shall be determined in accordance with EN 50564:2011, clause 5.3.(Note: EN50564:2011, 5.3.1 – Sampling Method)

Note: If load condition 1 cannot be maintained for the warm-up period or the stability period then compliance with this standard cannot be determined.

While the unit operates under each of the subsequent Load Conditions from 2 to 5 (See Table 1) for a period of time not necessary to repeat warm-up period, the technician shall record all the indicated measurements for each Load Condition, as indicated as above item 1 or 2

Table 1 – Load Conditions and testing sequence

Load Conditions for UUT	Percentage of Nameplate Output Current	Warm-up period by Load Conditions [minutes]	Assessment period after warm-up [minutes]
1	100% $\pm$ 2% ⁽¹⁾	30	5
2	75% $\pm$ 2%	0	5
3	50% $\pm$ 2%	0	5
4	25% $\pm$ 2%	0	5
5	0%	0	5
Note(s): ⁽¹⁾ The 2% allowance is of nameplate output current, not of the calculated current value. For example, a UUT at Load Condition 3 may be tested in a range from 48% (min) to 52% (max) of rated output current.			

EN50564-2011: Clause 5.3.1 – Sampling Method

Where the power consumption within a mode is not cyclic, the average power is assessed as follows:

1. The product shall be energized for not less than 15 min; this is the total period;
2. Any data from the first one third of the total period is always discarded. Data recorded in the second two thirds of the total period is used to determine stability;
3. Establishment of stability depends on the average power recorded in the second two thirds of the total period. For input powers less than or equal to 1 W, stability is established when a linear regression through all power readings for the second two thirds of the total period has a slope of less than 10 mW/h. For input powers of more than 1 W, stability is established when a linear regression through all power readings for the second two thirds of the total period has a slope of less than 1 % of the measured input power per hour.
4. Where a total period of 15 min does not result in the above stability criteria being satisfied, the total period is continuously extended until the relevant criteria above is achieved (in the second two thirds of the total period).
5. Once stability is achieved, the result is taken to be the average power consumed during the second two thirds of the total period.

NOTE: If stability cannot be achieved within a total period of 3 h, the raw data should be assessed to see whether there is any periodic or cyclic pattern present.

Where the power consumption within a mode is cyclic (i.e. a regular sequence of power states that occur over several minutes or hours), the average power over a minimum of four complete cycles is assessed as follows:

1. The product shall be energized for an initial operation period of not less than 10 min. Data during this period is not used to assess the power consumption of the product;
2. The product is then energized for a time sufficient to encompass two comparison periods, where each period shall include not less than two cycles and have a duration of not less than 10 min (comparison periods must contain the same number of cycles);
3. Calculate the average power for each comparison period;
4. Calculate the mid-point in time of each comparison period in hours;
5. Stability is established where the power difference between the two comparison periods divided by the time difference of the mid-points of the comparison periods has a slope of less than
 - 10 mW/h, for products where the input powers is less than or equal to 1 W; or
 - 1 % of the measured input power per hour, for products where the input powers is greater than 1 W
6. Where the above stability criteria is not satisfied, additional cycles are added equally to each comparison period until the relevant criteria above is achieved
7. Once stability is achieved, the power is determined as the average of all readings from both comparison periods.

Note: Where cycles are not stable or are irregular, sufficient data shall be measured to adequately characterize the power consumption of the **mode** (a minimum of 10 cycles is recommended).

Tested by: Frank Lin Tested by: Frank Lin Test Date: 2015-10-15
signature print
Sample #: 0919001-1 Instrument Code / Range: _____

ACTIVE/NO-LOAD MODE POWER CONSUMPTION TEST: (Cont'd)

RESULTS: (Cont'd)

Ambient Temperature (°C): 23 Relative Humidity (%): 55 Airspeed, room (m/s) : <0.5
Sample No.: 1
Input Test Voltage (Vac): 230 Input Test Frequency (Hz): 50 Rated Output Current (A): 0.75

External Power Supply Input Electric Data											Power Supply [DC] Output		
Load #	V	HZ	A	PF	THD	5 Minutes Stability Assessment %	*Stability value from Sampling or average power method if UUT failed 5 minute stability assessment	**Avg. Power (W)	Uncertainty of the equipment (Ue)	Interval [min]	V	A	**Avg. Power (W)
1 (100%)	229.59	50.00	0.410	0.42	0.25	0.13	--	39.7812	*	5	47.89	0.75	35.8692
2 (75%)	229.62	50.00	0.314	0.40	0.22	0.07	--	29.1768	*	5	48.10	0.55	26.6904
3 (50%)	229.64	50.00	0.217	0.39	0.20	0.10	--	19.5876	*	5	48.09	0.37	17.9796
4 (25%)	229.65	50.00	0.110	0.37	0.16	0.16	--	9.3876	*	5	48.08	0.18	8.5644
5 (0%)	229.67	50.00	0.035	0.01	0.14	18.13	-0.00000096	0.0556	*	10			

Efficiency of Power Supply					Power Consumed by UUT (W)				
100%	75%	50%	25%	Arithmetic Average of Efficiency at Load Conditions 1 – 4	100%	75%	50%	25%	No Load
90.166	91.47816	91.791	91.23099	91.16652005	3.912	2.4864	1.608	0.8232	0.0556

The calculated measurement uncertainty(Ue) shall be checked out under 0%, 25%, 50%, 75% and 100% load conditions, results ☒comply ☐do not comply with the requirement addressed in EN50563/EN50564 (Annex D):

- Input Power, the result shall be less than 2% for powers of 0.5 W or greater, or 10 mW for powers of less than 0.5W
- Output Power, the result shall be less than 2% for powers of 1 W or greater, or 0.02W for powers of less than 1W

*Ue=0.36 % value addressed in uncertainty measurement report

Ue Calculation Notes: _____

WORKSHEETS (CONT'D)

EU Directive for Energy-related Products 2009/125/EC and Implementing Measure no. EC 278/2009 for External Power Supply

Table 2: Energy-Efficiency Criteria for AC-AC and AC-DC External Power Supplies in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum Average Efficiency in Active Mode (expressed as a decimal)
0 to ≤ 1 Watt	$\geq 0.480 * P_o + 0.140$
> 1 to ≤ 51 Watts	$\geq [0.063 * \ln(P_o)] + 0.622$
> 51 Watts	≥ 0.870

Note: All efficiency values shall be rounded to the hundredths place.

Table 3: Energy-Efficiency Criteria for AC-AC and AC-DC External Power Supplies in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum Average Efficiency in Active Mode (expressed as a decimal)
0 to ≤ 1 Watt	$\geq 0.497 * P_o + 0.067$
> 1 to ≤ 51 Watts	$\geq [0.0750 * \ln(P_o)] + 0.561$
> 51 Watts	≥ 0.860

Note: All efficiency values shall be rounded to the hundredths place.

☒ Base on Tables 2 & 3, the calculated Minimum Average Efficiency in Active Mode is: 0.848 (84.8 %)

☒ The measured Minimum Average Efficiency in Active Mode is the following:

Model:	GST36B48		
Nameplate Output:	48VDC, 0.75A		
Minimum Average Efficiency in Active Mode	Sample No.:	0919001-1	
	Input Voltage:	230V, 50Hz	
	Efficiency :	0.911 (91.1 %)	

Table 4: Power Consumption Criteria for No-Load

Nameplate Output Power (P_{no})	Maximum Power in No-Load		
	Ac-Ac EPS	Ac-Dc EPS	Low Voltage EPS
0 to < 51 watts	≤ 0.5 watts	≤ 0.3 watts	≤ 0.3 watts
≥ 51 watts	≤ 0.5 watts	≤ 0.5 watts	n/a

☒ The measured Maximum Power In No-Load Condition is the following:

Model:	GST36B48		
Nameplate Output:	48VDC, 0.75A		
Maximum Power In No-Load Condition	Sample No.:	0919001-1	
	Input Voltage:	230V, 50Hz	
	Power :	0.055 W	

 UUT ☒ complies ☐ does not comply with requirements in:

EU Directive for Energy-related Products 2009/125/EC and Implementing Measure no. EC278/2009 for External Power Supply