



EPS Efficiency Test Report

Model Name: FSP230-A20C14	Test Date: 2019.JUL.15	Revision: 1
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PRODUCT INFORMATION:

Product name	AC to DC EPS(External Power Supply)
DC Cable	2000 mm 14 AWG
Weight	767 g
Dimension	200 * 100 * 27 mm
Trademark	FSP
Manufacturer	FSP Group Inc./No. 22, Jianguo E. Road, Taoyuan city, Taiwan
Testing laboratory	FSP Group Inc./No. 22, Jianguo E. Road, Taoyuan city, Taiwan

Rated:

Specification	Input	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6
Voltage(V)	100-240	20	---	---	---	---	---
Current(mA)	3000	11500	---	---	---	---	---
Frequency(Hz)	50-60	---	---	---	---	---	---
Power(W)	---	230					

Test Result:

Compliance with	
US DOE Level VI	YES
CEC Level IV	YES
Energy Star Level V	YES
ErP Tier 2	YES
AU GEMS	YES

Tested By: Kay Hsia
Kay Hsia

Approved By: Jason Wei
Jason Wei

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1. Test Equipment:

Item	Brand	Model	Calibrates Until
AC Source	CHROMA	6430/643000000908	2019/8/3
Electronic Load 1	CHROMA	63030/6300006368	2019/8/3
Electronic Load 2			
Electronic Load 3			
Electronic Load 4			
Electronic Load 5			
Electronic Load 6			
Power Meter	CHROMA	66202/662022003033	2019/8/3

2. Regulation:

US DOE	• 10 CFR Parts 429, 430 and 431
CEC	• CEC-400-2015-021
Energy Star	• EPS 2.0 Apr-08-2008
ErP (Lot 7)	• Commission Regulation (EC) No 278/2009
AU GEMS	• AS/NZS 4665:2005

The average active efficiency:

Agency	Rated Power	Low voltage	AC-DC
US DOE Level VI	$P_o \leq 1W$	$\geq 0.517 * P_o + 0.087$	$\geq 0.5 * P_o + 0.16$
	$1W < P_o \leq 49W$	$\geq 0.0834 * \ln(P_o) - 0.0014 * P_o + 0.609$	$\geq 0.071 * \ln(P_o) - 0.0014 * P_o + 0.67$
	$49W < P_o \leq 250W$	≥ 0.87	≥ 0.88
	$250W < P_o$	≥ 0.875	≥ 0.875
CEC Level IV	$P_o < 1W$	N/A	$\geq 0.5 * P_o$
	$1W \leq P_o \leq 51W$		$\geq 0.09 * \ln(P_o) + 0.5$
	$51W < P_o$		≥ 0.85
Energy Star Level V	$P_o \leq 1W$	$\geq 0.497 * P_o + 0.067$	$\geq 0.48 * P_o + 0.14$
	$1W < P_o \leq 49W$	$\geq 0.075 * \ln(P_o) + 0.561$	$\geq 0.0626 * \ln(P_o) + 0.622$
	$49W < P_o$	≥ 0.86	≥ 0.87
ErP Tier 2	$P_o \leq 1W$	$\geq 0.497 * P_o + 0.067$	$\geq 0.48 * P_o + 0.14$
	$1W < P_o \leq 51W$	$\geq 0.075 * \ln(P_o) + 0.561$	$\geq 0.063 * \ln(P_o) + 0.622$
	$51W < P_o$	≥ 0.86	≥ 0.87
AU GEMS	$P_o \leq 1W$	N/A	$\geq 0.5 * P_o$
	$1W < P_o \leq 51W$		$\geq 0.09 * \ln(P_o) + 0.5$
	$51W < P_o$		≥ 0.85

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The no-load condition of power consumption:

Agency	Rated Power	Low voltage	AC-DC
US DOE Level VI	$0W < P_o \leq 49W$	$\leq 0.1W$	$\leq 0.1W$
	$49W < P_o \leq 250W$	$\leq 0.21W$	$\leq 0.21W$
	$250W < P_o$	$\leq 0.5W$	$\leq 0.5W$
CEC Level IV	Any Output	N/A	$\leq 0.5W$
Energy Star Level V	$P_o < 50W$	N/A	$\leq 0.3W$
	$50W \leq P_o$		$\leq 0.5W$
ErP Tier 2	$P_o \leq 51W$	$\leq 0.3W$	$\leq 0.3W$
	$51W < P_o$	N/A	$\leq 0.5W$
AU GEMS	$0W < P_o$	N/A	$\leq 0.5W$

3. Test Method:

US DOE	• Test Method for Calculating the Energy Efficiency of External AC-DC and AC-AC Power Supplies" dated August 11, 2004
CEC	• Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies" dated August 11, 2004(except that the test voltage specified in Section 4(d) of the test method shall be only 115 volts, 60 Hz.)
Energy Star	• Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies" dated August 11, 2004
ErP	• EN 50563:2011/A1:2013
AU GEMS	• AS/NZS 4665.1

4. Test Setup:

- Connect the EUT to suitably calibrated AC source, power meter and electronic load.
- Warm up at least 30 minutes at 100% of nameplate current output.
- The EUT shall be tested at 100%, 75%, 50%, 25%, 10% of nameplate output current and no load condition.
- Measure the relative parameters required from test record.
- The input test voltage shall be used 115V/60HZ and 230V/50HZ.
- Ambient temperature: 23 +/-5°C.
- No-Load mode: Not connection to a product or any other load.

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5. Load Conditions:

The EUT was tested at four active mode load conditions and the no load condition according to Table 1 below by using electronics loads.

Table 1 – Load Condition for EUT

<i>Percentage of Nameplate Output Current</i>	
Load Condition 1	100% ± 2%
Load Condition 2	75%± 2%
Load Condition 3	50%± 2%
Load Condition 4	25%± 2%
Load Condition 5	10%± 1%
Load Condition 6	0% (no-load condition)

The 2% allowance is of nameplate output current, not of the calculated current value.

6. Test Result:

Agency	No load(W)		Average Efficiency	
	Standard	PASS / FAIL	Standard	PASS / FAIL
US DOE Level VI	≤ 0.21	PASS	≥ 0.8800	PASS
CEC Level IV	≤ 0.5	PASS	≥ 0.8500	PASS
Energy Star Level V	≤ 0.5	PASS	≥ 0.8700	PASS
ErP Tier 2	≤ 0.5	PASS	≥ 0.8700	PASS
AU GEMS	≤ 0.5	PASS	≥ 0.8500	PASS

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7. Test Record:

V190396 -1	115V/60Hz						230V/50Hz					
	No load	Active power values					No load	Active power values				
Load	0%	10%	25%	50%	75%	100%	0%	10%	25%	50%	75%	100%
Iout-1 (A)		1.16	2.87	5.74	8.64	11.51		1.16	2.87	5.74	8.64	11.51
Vout-1 (V)		20.28	20.20	20.06	19.91	19.77		20.28	20.19	20.06	19.91	19.76
Iout-2 (A)		/	/	/	/	/		/	/	/	/	/
Vout-2 (V)		/	/	/	/	/		/	/	/	/	/
Iout-3 (A)		/	/	/	/	/		/	/	/	/	/
Vout-3 (V)		/	/	/	/	/		/	/	/	/	/
Iout-4 (A)	--	/	/	/	/	/	--	/	/	/	/	/
Vout-4 (V)		/	/	/	/	/		/	/	/	/	/
Iout-5 (A)		/	/	/	/	/		/	/	/	/	/
Vout-5 (V)		/	/	/	/	/		/	/	/	/	/
Iout-6 (A)		/	/	/	/	/		/	/	/	/	/
Vout-6 (V)		/	/	/	/	/		/	/	/	/	/
Pout (W)		23.54	58.05	115.13	172.05	227.50		23.57	58.05	115.10	172.02	227.36
Fin (Hz)	60	60	60	60	60	60	50	50	50	50	50	50
Iin (A)	0.04	0.27	0.59	1.13	1.71	2.25	0.04	0.17	0.34	0.60	0.87	1.14
Vin (V)	115.43	115.37	115.29	115.27	115.14	115.02	230.18	230.15	230.12	230.06	230.00	229.94
Pin (W)	0.08	28.39	65.08	126.30	188.46	250.38	0.14	28.18	64.36	124.41	185.54	246.51
THDv (%)	0.10	0.09	0.08	0.07	0.04	0.05	0.05	0.04	0.04	0.04	0.04	0.04
PF (W/VA)	0.02	0.90	0.95	0.97	0.96	0.97	0.01	0.70	0.82	0.90	0.93	0.94
Power consumed (W)	0.08	4.86	7.02	11.17	16.41	22.88	0.14	4.61	6.32	9.31	13.52	19.14
Efficiency	--	0.8290	0.8921	0.9116	0.9129	0.9086	--	0.8365	0.9018	0.9252	0.9271	0.9223
Average Efficiency	--	--	0.9063				--	--	0.9191			

Fig.1

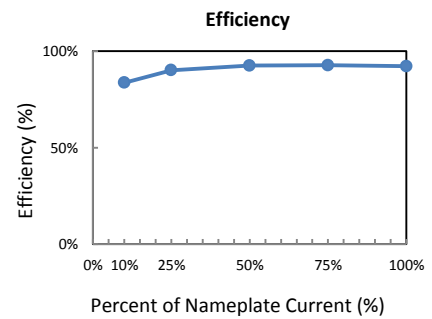
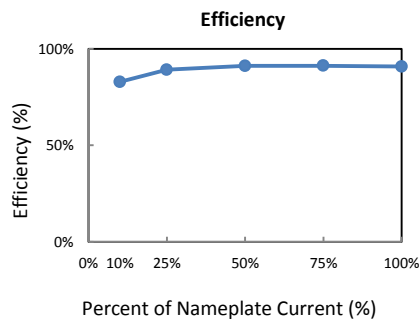
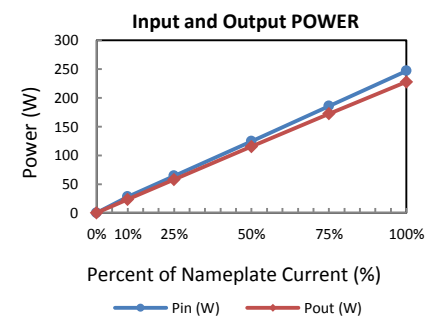
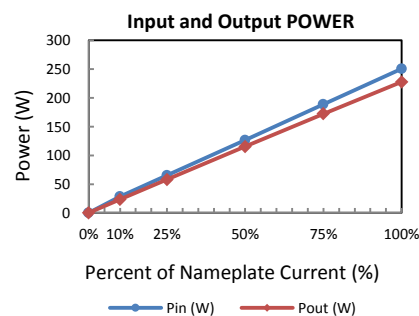


Fig.2



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V190396 -2	115V/60Hz						230V/50Hz					
	No load	Active power values					No load	Active power values				
Load	0%	10%	25%	50%	75%	100%	0%	10%	25%	50%	75%	100%
Iout-1 (A)		1.16	2.88	5.74	8.64	11.51		1.16	2.88	5.74	8.64	11.51
Vout-1 (V)		20.27	20.19	20.05	19.90	19.75		20.27	20.19	20.05	19.90	19.75
Iout-2 (A)												
Vout-2 (V)												
Iout-3 (A)												
Vout-3 (V)												
Iout-4 (A)	--						--					
Vout-4 (V)												
Iout-5 (A)												
Vout-5 (V)												
Iout-6 (A)												
Vout-6 (V)												
Pout (W)		23.56	58.06	115.09	172.02	227.39		23.56	58.06	115.05	171.97	227.34
Fin (Hz)	60	60	60	60	60	60	50	50	50	50	50	50
Iin (A)	0.04	0.28	0.59	1.13	1.71	2.25	0.04	0.18	0.34	0.61	0.87	1.14
Vin (V)	115.40	115.33	115.36	115.24	115.11	114.98	230.23	230.20	230.16	230.11	230.05	229.99
Pin (W)	0.08	28.24	64.99	126.17	188.29	250.13	0.15	28.05	64.28	124.30	185.33	246.26
THDv (%)	0.10	0.09	0.08	0.07	0.04	0.05	0.05	0.05	0.04	0.04	0.04	0.04
PF (W/VA)	0.02	0.89	0.95	0.97	0.96	0.97	0.02	0.69	0.82	0.89	0.92	0.94
Power consumed (W)	0.08	4.68	6.92	11.07	16.27	22.74	0.15	4.49	6.22	9.25	13.36	18.92
Efficiency	--	0.8344	0.8935	0.9122	0.9136	0.9091	--	0.8401	0.9033	0.9256	0.9279	0.9232
Average Efficiency	--	--	0.9071				--	--	0.9200			

Fig.1

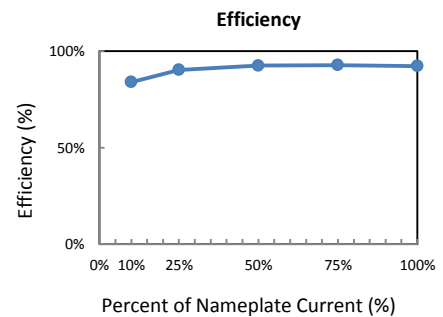
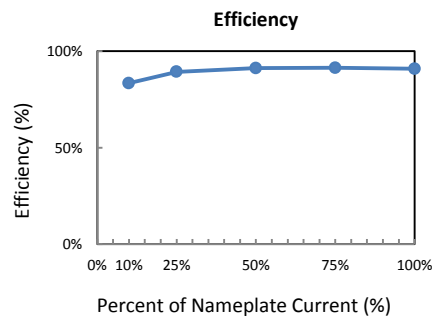
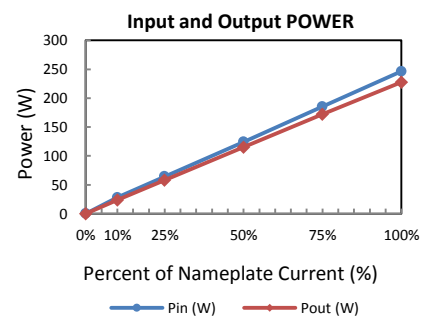
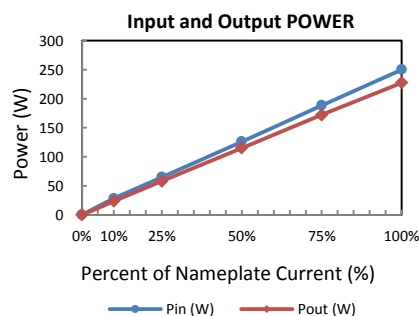


Fig.2



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V190396 -3	115V/60Hz						230V/50Hz					
	No load	Active power values					No load	Active power values				
Load	0%	10%	25%	50%	75%	100%	0%	10%	25%	50%	75%	100%
Iout-1 (A)		1.16	2.87	5.74	8.64	11.51		1.16	2.87	5.74	8.64	11.50
Vout-1 (V)		20.23	20.14	20.00	19.84	19.68		20.23	20.15	20.00	19.85	19.69
Iout-2 (A)												
Vout-2 (V)												
Iout-3 (A)												
Vout-3 (V)												
Iout-4 (A)	--						--					
Vout-4 (V)												
Iout-5 (A)												
Vout-5 (V)												
Iout-6 (A)												
Vout-6 (V)												
Pout (W)		23.52	57.90	114.81	171.49	226.51		23.52	57.90	114.74	171.47	226.49
Fin (Hz)	60	60	60	60	60	60	50	50	50	50	50	50
Iin (A)	0.04	0.27	0.59	1.13	1.70	2.24	0.04	0.17	0.34	0.60	0.87	1.13
Vin (V)	115.39	115.44	115.36	115.24	115.11	114.98	230.24	230.20	230.17	230.11	230.05	229.99
Pin (W)	0.08	28.22	64.96	126.04	188.05	249.84	0.13	27.98	64.26	124.27	185.31	246.23
THDv (%)	0.10	0.09	0.08	0.07	0.04	0.05	0.05	0.04	0.04	0.04	0.04	0.04
PF (W/VA)	0.02	0.89	0.95	0.97	0.96	0.97	0.01	0.70	0.83	0.90	0.93	0.94
Power consumed (W)	0.08	4.70	7.06	11.23	16.56	23.33	0.13	4.46	6.36	9.52	13.84	19.74
Efficiency	--	0.8335	0.8914	0.9109	0.9119	0.9066	--	0.8405	0.9011	0.9234	0.9253	0.9198
Average Efficiency	--	--	0.9052				--	--	0.9174			

Fig.1

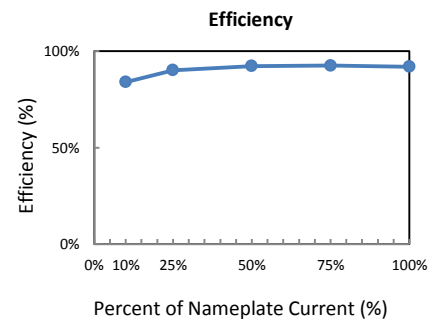
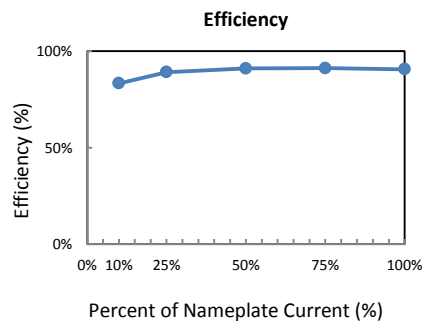
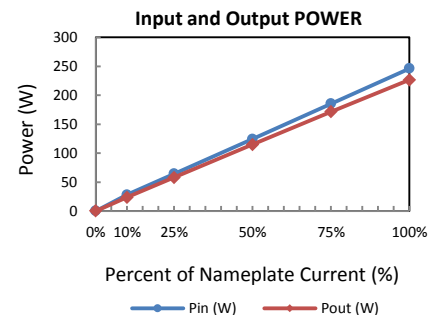
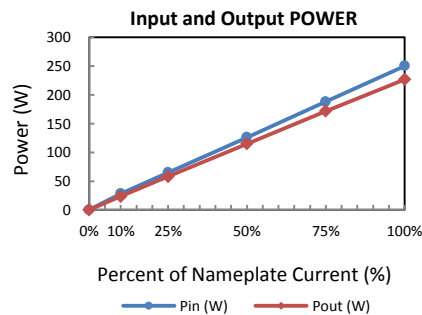


Fig.2



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8. Product Photo:

