

192W

Switching Power Adapter

SPECIFICATION

Description : 12Volts / 16Amps

Part No. : AD-AT12160

Version : 02

Date : 14 - Jul. - 2010

1. Feature :

- ◆ **Input** : Universal 100 ~ 240 Vac / 47 ~ 63 Hz Input, without any slide switch.
- ◆ **Output** : +12V / 0 ~ 16A
- ◆ **Case Dimension** : 183.2(L) * 81.0(W) * 42.3(H) mm
- ◆ **Efficiency** : Eff (av) \geq 87%
- ◆ **Safety** : CUL / UL / GS / PSE / BSMI
- ◆ **EMI** : CE / FCC Class B ; Conduction & Radiation Met.
- ◆ **Protection** : OVP (Over Voltage Protection) 、 SCP (Short Circuit Protection) 、 OCP (Over Current Protection) 、 OTP (Over Temperature Protection)
- ◆ High frequency design , less power consumption.
- ◆ Suitable for usage at Telecommunication, Computer, Industrial Controller, & OA System.
- ◆ Meet Energy Star V / Erp (Stage 2) / MEPS V .

2. Input :

2.1 Voltage	Universal 100 ~ 240Vac, single phase
2.2 Frequency	47 ~ 63 Hz
2.3 Current	2.8A Max.
2.4 Inrush Current	100A Max. / 240Vac (Cold start at 25 °C , full load)
2.5 Efficiency	Eff (av) \geq 87% (At 115 Vac & 230 Vac)
2.6 Power Consumption	Pi \leq 0.5W (At 240Vac & No load)
2.7 Power Factor (PF)	Pi \geq 0.9 (At 115 Vac & 230 Vac, At Full load)

$$\text{※Eff (av)} = \frac{E_1 + E_2 + E_3 + E_4}{4}$$

E1=efficiency with 25% rated load ; E2= efficiency with 50% rated load
E3=efficiency with 75% rated load ; E4= efficiency with 100% rated load

3. Output :

3.1 DC Output	Voltage	+12.00V \pm 5%
	Current	16A Max.
	Regulation	11.4Vmin. ~ 12.0Vtyp. ~ 12.6Vmax.
	Ripple & Noise	240mV Max.
	Total Power	192W Max.

Remark : For ripple & noise measurement, use a 20MHz bandwidth frequency oscilloscope, and add a 0.1 μ F multilayer Cap. and a Low ESR Electrolytic Cap. (10 μ F) at output connector terminals. (At nominal line voltage, full load)

4. Protection :

4.1 Over Voltage Protection (OVP)	Vout * (105% ~ 150%)
4.2 Over Current Protection(OCP)	Iout * (105% ~ 150%)
4.3 Short Circuit Protection (SCP)	Latch.
4.4 Over Temperature Protection (OTP)	Latch.

Remark : When Short Circuit Protection or Over Current Protection or Over Voltage Protection or Over Temperature Protection is activated, the power supply will latch.

5. Safety 、 EMI and EMC Requirement :

5.1 Safety Requirement

a. Safety : CUL / UL / GS / PSE / BSMI

b. Dielectric Strength : Cut off current 10mA

(1)	Primary to Secondary	1800Vac for 1 Minute
(2)	Primary to Frame Ground	1500Vac for 1 Minute

c. Insulation Resistance :

(1)	Primary to Secondary	10 M ohm for 500Vdc
(2)	Primary to Frame Ground	10 M ohm for 500Vdc

5.2 EMI Requirement : CE / FCC Class B ; Conduction & Radiation Met.

5.3 Leakage Current : Less than 3.5mA

6. Operation and Environment Performance :

6.1 Temperature Range

Operating	+ 0°C ~ + 40°C
Storage	- 20 °C ~ + 80 °C

6.2 Humidity Range (Non-condensing)

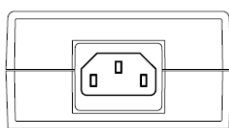
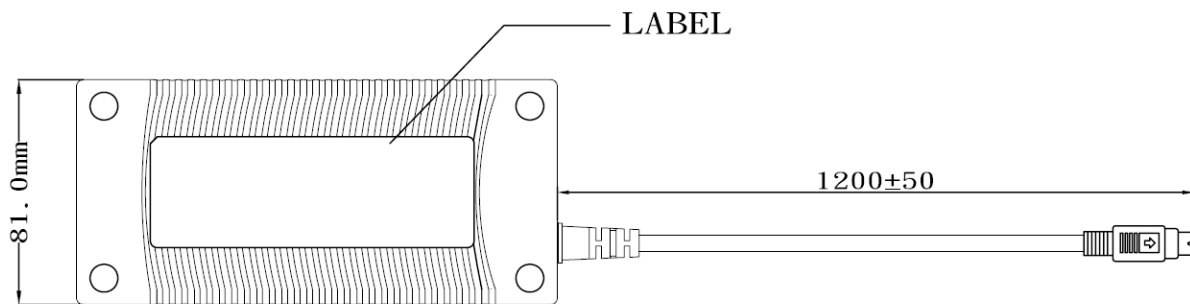
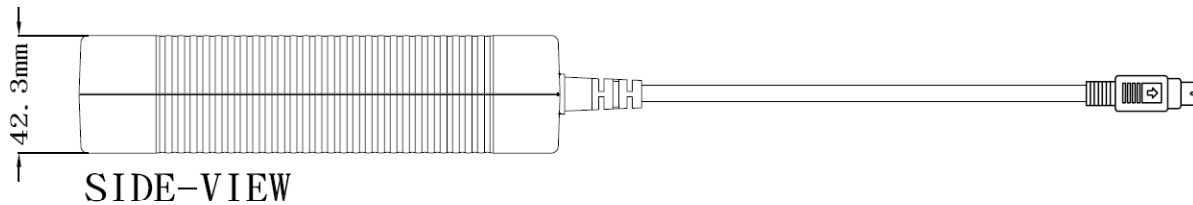
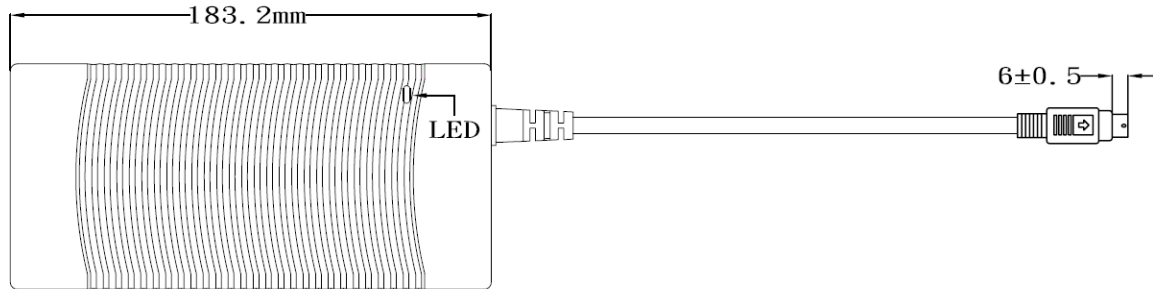
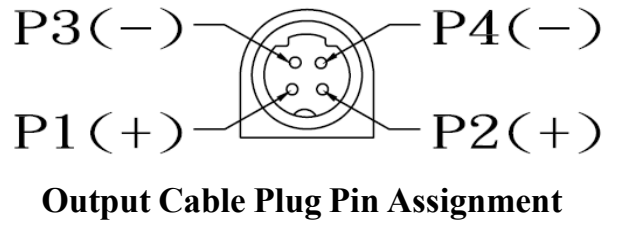
Operating	20% ~ 80% RH
Storage	10% ~ 90% RH

6.3 Cooling : By natural air.

7. M.T.B.F. : 50,000 hours min. (at 25°C, by MIL-HDBK-217F)

8. Mechanical :

- 8.1 Weight : 800g Typical
- 8.2 Cable Type : Black UL2464 AWG16 * 4C
(Wire + Plug)
Plug : 4PIN DIN
- 8.3 Cable Length : 1200mm
- 8.4 Case Dimension : 183.2mm(L) * 81.0mm(W) * 42.3mm(H)
- 8.5 Material Flammability : UL 94V-0
- 8.6 External Appearance : As drawing below (Scale → mm)



A. Line Regulation Test

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
90Vac / 50 % Load	11.4 V ~ 12.6 V	11.949V	12.011V	11.982V
115Vac / 50 % Load	11.4 V ~ 12.6 V	11.949V	12.011V	11.982V
132Vac / 50 % Load	11.4 V ~ 12.6 V	11.949V	12.011V	11.982V
180Vac / 50 % Load	11.4 V ~ 12.6 V	11.949V	12.011V	11.982V
230Vac / 50 % Load	11.4 V ~ 12.6 V	11.949V	12.011V	11.982V
264Vac / 50 % Load	11.4 V ~ 12.6 V	11.949V	12.011V	11.982V

B. Efficiency Test

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115Vac	87 % Min.	88.54%	88.34%	88.72%
230Vac	87 % Min.	89.62%	89.12%	89.78%

$$\text{Eff (av)} = \frac{E_1 + E_2 + E_3 + E_4}{4}$$

E1=efficiency with 25% rated load ; E2= efficiency with 50% rated load
E3=efficiency with 75% rated load ; E4= efficiency with 100% rated load

C. Load Regulation Test

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115Vac / 0 % Load	11.4 V ~ 12.6 V	12.190V	12.267V	12.208V
115Vac / 50 % Load	11.4 V ~ 12.6 V	11.948V	12.012V	11.979V
115Vac / 100 % Load	11.4 V ~ 12.6 V	11.705V	11.755V	11.749V
230Vac / 0 % Load	11.4 V ~ 12.6 V	12.190V	12.268V	12.208V
230Vac / 50 % Load	11.4 V ~ 12.6 V	11.948V	12.011V	11.980V
230Vac / 100 % Load	11.4 V ~ 12.6 V	11.705V	11.753V	11.752V

D. Ripple & Noise Test

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115Vac / 100 % Load	240mV Max.	106.2mV	109.4mV	110.9mV
230Vac / 100 % Load	240mV Max.	107.8mV	107.8mV	118.7 mV

E. Inrush Current

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
240Vac / 100 % Load	100A Max.	72.1A	73.5A	74.3A

F. Over Voltage Protection

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115Vac	Vout*(105%~150%)	136%	137%	136%
230Vac	Vout*(105%~150%)	136%	137%	136%

G. Over Current Protection

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115Vac	Iout*(105%~150%)	123%	122%	117%
230Vac	Iout*(105%~150%)	122%	122%	117%

H. Short Circuit Protection

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115Vac	Latch	OK	OK	OK
230Vac	Latch	OK	OK	OK

I. Input Power Consumption(No Load)

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
230Vac / 0 % Load	≤ 0.5 W	0.416W	0.436W	0.395W

J. Power Factor

Test Result :

Test condition	Spec.	Reading 1	Reading 2	Reading 3
115Vac / 100 % Load	≥ 0.9	0.989	0.988	0.993
230Vac / 100 % Load	≥ 0.9	0.987	0.988	0.992

Efficiency Test Report

- A. Model Number AD-AT12160 (12V/16A)
- B. DC Power Cord UL2464, 16AWG*4C, 1.5M
- C. Average Efficiency
 Energy Star V 87% min.
 Eup (Stage 2) 87% min.
 MEPS V 87% min.
- D. NO Load Power Consumption
 Energy Star V 0.5W max.
 Eup (Stage 2) 0.5W max.
 MEPS V 0.5W max.
- E. Testing Equipment
 1. AC Power Source "APE" APW-110N
 2. Electronic Load "PRODIGIT" 3356
 3. Power Meter "YOKOGAWA" & "IDR WT210
 4. Digital Meter "FLUKE" 45
- F. AC Input Voltage 115Vac/60Hz

Reported Quantity \ Load Conditions	100% * I ₀	75% * I ₀	50% * I ₀	25% * I ₀	0% * I ₀
Rms Output Current (mA)	16000mA	12000mA	8000mA	4000mA	0mA
Rms Output Voltage(V)	11.751V	11.864V	11.979V	12.094V	12.210V
Active Output Power(W)	188.02W	142.37W	95.83W	48.38W	0.00W
Rms Input Voltage(V)	115V	115V	115V	115V	115V
Rms Input Current (A)	1.879A	1.398A	0.929A	0.481A	0.033A
Rms Input Power(W)	214.60W	159.40W	106.50W	55.00W	0.28W
Voltage T.H.D.(%)	0.49	0.23	0.16	0.17	0.10
True Power Factor	0.993	0.991	0.997	0.994	0.074
Power Consumed by UUT(W)	26.58W	17.03W	10.67W	6.62W	0.28W
Efficiency	87.61%	89.31%	89.98%	87.96%	*
Average Efficiency	88.72%				*

- G. AC Input Voltage 230Vac/50Hz

Reported Quantity \ Load Conditions	100% * I ₀	75% * I ₀	50% * I ₀	25% * I ₀	0% * I ₀
Rms Output Current (mA)	16000mA	12000mA	8000mA	4000mA	0mA
Rms Output Voltage(V)	11.752V	11.865V	11.980V	12.094V	12.210V
Active Output Power(W)	188.03W	142.38W	95.84W	48.38W	0.00W
Rms Input Voltage(V)	230V	230V	230V	230V	230V
Rms Input Current (A)	0.922A	0.699A	0.486A	0.307A	0.034A
Rms Input Power(W)	210.30W	157.90W	105.40W	54.60W	0.39W
Voltage T.H.D.(%)	0.16	0.13	0.13	0.19	0.10
True Power Factor	0.992	0.982	0.943	0.773	0.050
Power Consumed by UUT(W)	22.27W	15.52W	9.56W	6.22W	0.39W
Efficiency	89.41%	90.17%	90.93%	88.60%	*
Average Efficiency	89.78%				*