



Specification for Approval

Customer : AKON Co.,Ltd.

Part Name : AC Adapter

Description : 54.0Volts / 1.66Amps

Model No. : ATS090A1-P540

Customer P / N :

Product P / N :

Issued Date : 30 - Apr. - 2024

Version : 01

Issued Stamp :

Customer's Approval Signature

ADAPTER TECHNOLOGY CO.,LTD.

Office (Taiwan) : 6F,No.258, Liancheng Rd.,Zhonghe District,New Taipei City 235,Taiwan (R.O.C.)

TEL : +886-2-8226-2279

FAX : +886-2-8226-2238

E-mail : service@adaptech.com.tw ; service_tw @adaptech.com.tw

Factory (China) : BOAYANG ELECTRONICS CO., LTD.



89.64 W
AC Adapter
SPECIFICATION

Model No. : **ATS090A1-P540**

Description : **54.0 Volts / 1.66 Amps**

Part No. :

Version : **01**

Date : **30 - Apr. - 2024**

| Approved | Reviewed | Checked | Prepared | Sales |
|----------|----------|---------|----------|-------|
| | | | | |



1. Feature :

- ◆ **Input** : Universal 100 ~ 240 Vac / 50 ~ 60 Hz Input, without any slide switch.
- ◆ **Output** : +54.0V / 0 ~ 1.66A
- ◆ **Case Dimension** : 133.5 (L) * 53.5 (W) * 33.0 (H) ± 1mm
- ◆ **Efficiency** : Eff (av) ≥ 88%
Eff ≥ 79% @ 10% load
- ◆ **Safety** : PSE
- ◆ **EMI** : (conduction & radiation Class B)
- ◆ **Protection** : OVP (Over Voltage Protection) 、SCP (Short Circuit Protection) 、
OCP (Over Current Protection) 、OTP (Over Temperature Protection)
- ◆ Suitable for usage at I.T.E., industrial controller
- ◆ Meet DoE Level VI / ErP (Lot 7)

2. Input :

| | |
|-----------------------|--|
| 2.1 Voltage | Universal 100 ~ 240 Vac , single phase |
| 2.2 Frequency | 50 ~ 60 Hz |
| 2.3 Current | 1.2 A Max. |
| 2.4 Inrush Current | 80 A max. / 230 Vac (Cold start at 25 °C , full load) (ac source chroma 6530) |
| 2.5 Efficiency | Eff (av) ≥ 88 % (At 115 Vac & 230 Vac) Eff ≥ 79 % @ 10 % load (At 230 Vac) |
| 2.6 Power Consumption | Pi ≤ 0.21W (At 115 Vac & 230 Vac & At No load) |
| 2.7 Power Factor (PF) | Pi ≥ 0.9 (At 115 Vac & 230 Vac, At Full load) |

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

E_1 =efficiency with 25% rated load , E_2 = efficiency with 50% rated load
 E_3 =efficiency with 75% rated load , E_4 = efficiency with 100% rated load

3. Output :

| | | |
|---------------|----------------|-----------------------------------|
| 3.1 DC Output | Voltage | +54.0V ± 5% |
| | Current | 1.66 A Max. |
| | Regulation | 51.3Vmin. ~ 54.0Vtyp. ~ 56.7Vmax. |
| | Ripple & Noise | 648mVp-p Max. |
| | Total Power | 89.64W Max. |

Remark : For ripple & noise measurement, use a 20MHz bandwidth frequency oscilloscope, and add a 0.1μF multilayer Cap. and a Low ESR Electrolytic Cap. (47 μF) at output connector terminals. (At nominal line voltage, full load)



4. Protection :

| | |
|---------------------------------------|--|
| 4.1 Over Voltage Protection (OVP) | V out * 150% Max., latch off.(50 % Load) |
| 4.2 Short Circuit Protection (SCP) | Autorecovery. |
| 4.3 Over Current Protection (OCP) | I out * 180% Max, autorecovery. |
| 4.4 Over Temperature Protection (OTP) | Autorecovery. |

5. Safety requirement :

5.1. Dielectric strength : Cut off current 10 mA

| | | |
|------------------------------------|-------------------------|----------------------------|
| (1) | Primary to secondary | 3000Vac (RMS) for 1 minute |
| (2) | Primary to frame ground | 1770Vac (RMS) for 1 minute |
| ※ Secondary return connected to FG | | |

5.2. Insulation resistance :

| | | |
|------------------------------------|-------------------------|------------------|
| (1) | Primary to secondary | 10 MΩ for 500Vdc |
| (2) | Primary to frame ground | 10 MΩ for 500Vdc |
| ※ Secondary return connected to FG | | |

5.3 Leakage current : Less than 5 mA (RMS) or 7.07 mA (Peak)

5.4 Grounding test : < 0.1Ω

6. Operation and environment performance :

6.1 Temperature range

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

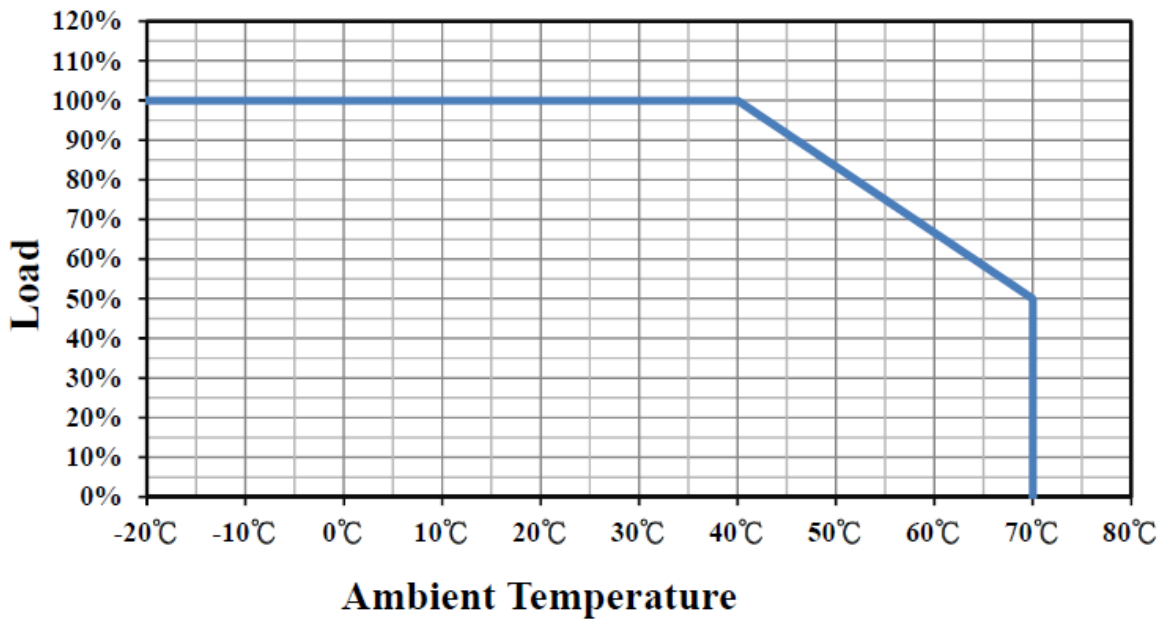
6.2 Humidity range(non-condensing)

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

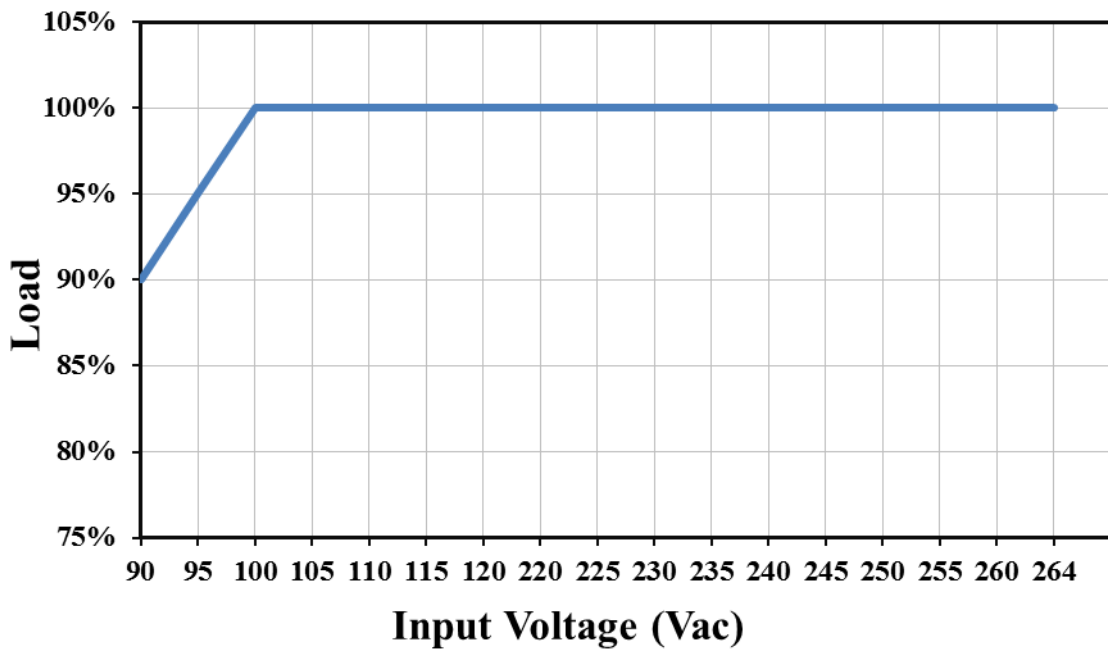
6.3 Cooling : By natural air.

7. M.T.B.F. : 300,000Hrs.(Calculated Hours at 25°C , By Telcordia SR-332)

8. Derating Curve :



9. Static Characteristics :



10. Mechanical :

10.1 Weight : 292g Ref.

10.2 Cable type : Black UL1185 20AWG
(wire + plug)

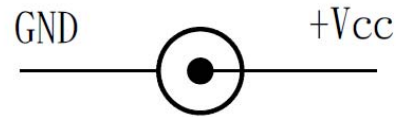
Plug : $\phi 4.0 * \phi 1.7 * 9.5$ mm
(tuning fork & cannellure)

10.3 Cable length : 1500 mm

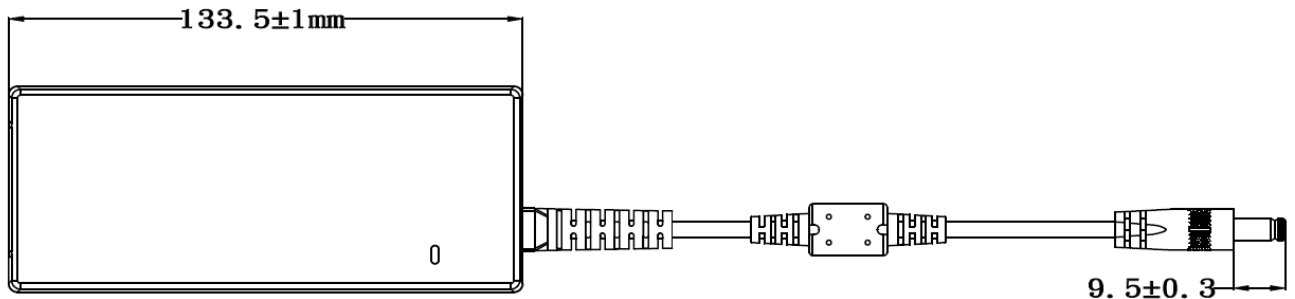
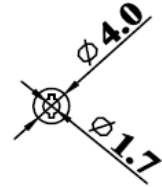
10.4 Case dimension : 133.5mm(L) * 53.5mm(W) * 33mm(H) ± 1 mm

10.5 Material flammability : UL 94V-0

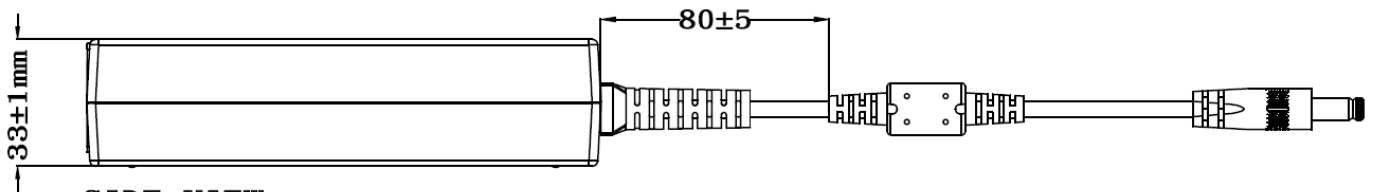
10.6 External appearance : As drawing below (scale \rightarrow mm)



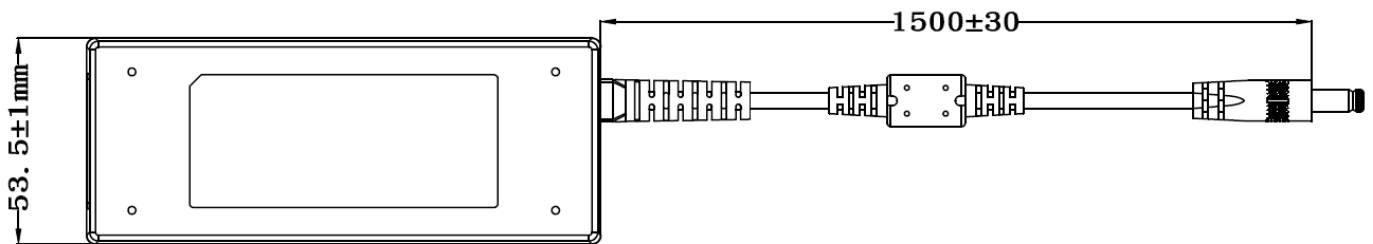
Output cable plug pin assignment



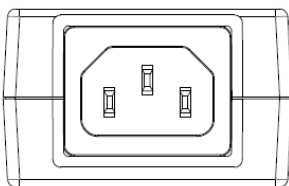
TOP-VIEW



SIDE-VIEW



BOTTOM-VIEW



FRONT-VIEW

11. Label :

- 11.1 Label materials : Metalized polyester label (silver gloss)
- 11.2 Color : Black background with silver printing
- 11.3 Label dimension : 79 (L)*33.5 (W) +/- 0.2 mm
- 11.4 Label thickness : 75 #

100%



"XXX"

Label supplier's code
It is accurate that the number of words depends on the real finished product

200%





A. Line Regulation Test

Test Result :

| Test condition | Spec. | Reading 1 | Reading 2 | Reading 3 |
|---------------------|-----------------|-----------|-----------|-----------|
| 90 Vac / 50 % Load | 51.3 V ~ 56.7 V | 53.97V | 53.66V | |
| 115 Vac / 50 % Load | 51.3 V ~ 56.7 V | 53.97V | 53.66V | |
| 132 Vac / 50 % Load | 51.3 V ~ 56.7 V | 53.97V | 53.66V | |
| 180 Vac / 50 % Load | 51.3 V ~ 56.7 V | 53.97V | 53.66V | |
| 230 Vac / 50 % Load | 51.3 V ~ 56.7 V | 53.97V | 53.66V | |
| 264 Vac / 50 % Load | 51.3 V ~ 56.7 V | 53.97V | 53.66V | |

B. Efficiency Test

Test Result :

| Test condition | Spec. | Reading 1 | Reading 2 | Reading 3 |
|-------------------|-----------|-----------|-----------|-----------|
| 115 Vac | 88 % Min. | 92.00% | 91.69% | |
| 230 Vac | 88 % Min. | 92.27% | 92.07% | |
| 230 Vac@10 % load | 79 % Min. | 84.40% | 83.51% | |

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

E_1 =efficiency with 25% rated load, E_2 = efficiency with 50% rated load
 E_3 =efficiency with 75% rated load, E_4 = efficiency with 100% rated load

C. Load Regulation Test

Test Result :

| Test condition | Spec. | Reading 1 | Reading 2 | Reading 3 |
|----------------------|-----------------|-----------|-----------|-----------|
| 115 Vac / 0 % Load | 51.3 V ~ 56.7 V | 54.06V | 53.76V | |
| 115 Vac / 50 % Load | 51.3 V ~ 56.7 V | 53.97V | 53.66V | |
| 115 Vac / 100 % Load | 51.3 V ~ 56.7 V | 53.86V | 53.55V | |
| 230 Vac / 0 % Load | 51.3 V ~ 56.7 V | 54.06V | 53.76V | |
| 230 Vac / 50 % Load | 51.3 V ~ 56.7 V | 53.97V | 53.66V | |
| 230 Vac / 100 % Load | 51.3 V ~ 56.7 V | 53.86V | 53.55V | |

D. Ripple & Noise Test

Test Result :

| Test condition | Spec. | Reading 1 | Reading 2 | Reading 3 |
|----------------------|---------------|------------|------------|-----------|
| 115 Vac / 100 % Load | 684 mVp-p Max | 52.7 mVp-p | 49.7 mVp-p | |
| 230 Vac / 100 % Load | 684 mVp-p Max | 58.3 mVp-p | 53.3 mVp-p | |



E. Inrush Current

Test Result :

| Test condition | Spec. | Reading 1 | Reading 2 | Reading 3 |
|----------------------|-----------|-----------|-----------|-----------|
| 230 Vac / 100 % Load | 80 A Max. | 61.8A | 64.2A | |

F. Over Voltage Protection

Test Result :

| Test condition | Spec. | Reading 1 | Reading 2 | Reading 3 |
|---------------------|-------------------|-----------|-----------|-----------|
| 115 Vac / 50 % Load | Vout * 150 % Max. | 134% | 132% | |
| 230 Vac / 50 % Load | Vout * 150 % Max. | 134% | 133% | |

G. Over Current Protection

Test Result :

| Test condition | Spec. | Reading 1 | Reading 2 | Reading 3 |
|----------------------|-------------------|-----------|-----------|-----------|
| 115 Vac / 100 % Load | Iout * 180 % Max. | 135% | 137% | |
| 230 Vac / 100 % Load | Iout * 180 % Max. | 135% | 137% | |

H. Short Circuit Protection

Test Result :

| Test condition | Spec. | Reading 1 | Reading 2 | Reading 3 |
|----------------------|---------------|-----------|-----------|-----------|
| 115 Vac / 100 % Load | Auto Recovery | OK | OK | |
| 230 Vac / 100 % Load | Auto Recovery | OK | OK | |

I. Input Power Consumption(No Load)

Test Result :

| Test condition | Spec. | Reading 1 | Reading 2 | Reading 3 |
|--------------------|---------------|-----------|-----------|-----------|
| 115 Vac / 0 % Load | ≤ 0.21 W | 0.097W | 0.096W | |
| 230 Vac / 0 % Load | ≤ 0.21 W | 0.107W | 0.100W | |

J. Power Factor

Test Result :

| Test condition | Spec. | Reading 1 | Reading 2 | Reading 3 |
|----------------------|------------|-----------|-----------|-----------|
| 115 Vac / 100 % Load | ≥ 0.9 | 0.982 | 0.986 | |
| 230 Vac / 100 % Load | ≥ 0.9 | 0.940 | 0.934 | |



Adapter Technology Co., Ltd.

Efficiency Test Report

- A. Model Number : ATS090A1-P540 54.0V 1.66A 89.64W
- B. DC Power Cord : UL1185 20AWG , 1.5M
- C. Average Efficiency :
- Erp (LOT 7) 88.0% Min.
 - DoE Level VI 88.0% Min.
 - GEMS Level VI 88.0% Min.
 - CoC Tier 2 89.0% Min.
 - CoC Tier 2 (10% Load) 79.0% Min.
- D. NO Load Power Consumption :
- Erp (LOT 7) 0.21W Max.
 - DoE Level VI 0.21W Max.
 - GEMS Level VI 0.21W Max.
 - CoC Tier 2 0.15W Max.
- E. Testing Dequpment :
- a. AC Power Source : " Chroma " 61604
 - b. Electronic Load : " PRODIGIT " 3311F
 - c. Power Meter : " YOKOGAWA " WT-310A
 - d. Digital Meter : " FLUKE " 45
- F. AC Input Voltage : 115Vac/60Hz

| Load Conditions Reported Quantity | 100%* I ₀ | 75%* I ₀ | 50%* I ₀ | 25%* I ₀ | 10%* I ₀ | 0%* I ₀ |
|--|------------------------|---------------------|---------------------|---------------------|---------------------|--------------------|
| | Rms Output Current(mA) | 1660mA | 1245mA | 830mA | 415mA | 166mA |
| Rms Output Voltage(V) | 53.910V | 53.970V | 54.020V | 54.080V | 54.100V | 54.120V |
| Active Output Power(W) | 89.49W | 67.19W | 44.84W | 22.44W | 8.98W | 0.00W |
| Rms Input Voltage(V) | 115V | 115V | 115V | 115V | 115V | 115V |
| Rms Input Current(A) | 0.857A | 0.647A | 0.349A | 0.237A | 0.117A | 0.057A |
| Rms Input Power(W) | 96.780W | 72.510W | 48.490W | 24.823W | 10.720W | 0.097W |
| True Power Factor (PF) | 0.982 | 0.975 | 1.207 | 0.910 | 28.650 | 0.015 |
| Total Harmonic Distortion of the input current | 11.9A% | 13.6A% | 16.5A% | 21.2A% | 23.9A% | 3.7A% |
| Power Consumed by UUT(W) | 7.289W | 5.317W | 3.653W | 2.380W | 1.739W | 0.097W |
| Active Efficiency | 92.468% | 92.667% | 92.466% | 90.413% | 83.774% | * |
| Average Efficiency | 92.003% | | | | 83.774% | * |

- G. AC Input Voltage : 230Vac/50Hz

| Load Conditions Reported Quantity | 100%* I ₀ | 75%* I ₀ | 50%* I ₀ | 25%* I ₀ | 10%* I ₀ | 0%* I ₀ |
|--|------------------------|---------------------|---------------------|---------------------|---------------------|--------------------|
| | Rms Output Current(mA) | 1660mA | 1245mA | 830mA | 415mA | 166mA |
| Rms Output Voltage(V) | 53.920V | 53.970V | 54.030V | 54.080V | 54.100V | 48.120V |
| Active Output Power(W) | 89.51W | 67.19W | 44.84W | 22.44W | 8.98W | 0.00W |
| Rms Input Voltage(V) | 230V | 230V | 230V | 230V | 230V | 230V |
| Rms Input Current(A) | 0.442A | 0.343A | 0.246A | 0.154A | 0.106A | 0.084A |
| Rms Input Power(W) | 95.430W | 71.870W | 48.410W | 25.172W | 10.640W | 0.107W |
| True Power Factor (PF) | 0.940 | 0.912 | 0.856 | 0.711 | 0.436 | 0.006 |
| Total Harmonic Distortion of the input current | 18.9A% | 21.1A% | 24.1A% | 22.1A% | 52.2A% | 4.2A% |
| Power Consumed by UUT(W) | 5.923W | 4.677W | 3.565W | 2.729W | 1.659W | 0.107W |
| Active Efficiency | 93.794% | 93.492% | 92.636% | 89.159% | 84.404% | * |
| Average Efficiency | 92.270% | | | | 84.404% | * |

Tester : Ray