



# Specification for Approval

**Customer** : 株式会社アコン

**Part name** : AC Adapter

**Description** : 53.0 Volts / 1.69 Amps

**Model no.** : ATS090T-P530 (CoC Tier 2)

**Customer P / N** :

**Product P / N** :

**Issued date** : 14 - Oct. - 2022

**Version** : 01

**Issued stamp** :

**Customer's approval signature**

**ADAPTER TECHNOLOGY CO.,LTD.**

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



**89.6 W  
AC Adapter  
Specification**

**Model no.** : **ATS090T-P530 (CoC Tier 2)**

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**Description** : **53.0 Volts / 1.69 Amps**

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





## 1. Feature :

- ◆ **Input** : Universal 100 ~ 240 Vac / 50 ~ 60 Hz input , without any slide switch
- ◆ **Output** : +53.0 V / 0 ~ 1.69 A
- ◆ **Case dimension** : 139.0 (L) \* 61.0 (W) \* 36.0 (H) mm ± 1 mm
- ◆ **Efficiency** : Eff<sub>(av)</sub> ≥ 89 % (at 115 Vac & 230 Vac)  
Eff ≥ 79 % (at 115 Vac & 230 Vac, 10% load)
- ◆ **Safety** : PSE
- ◆ **EMC** :
- ◆ **Protection** : OVP (Over voltage protection) 、 SCP (Short circuit protection) 、 OCP (Over current protection)
- ◆ **Suitable for usage at I.T.E., industrial controller**
- ◆ **Meet NRCan / DoE Level VI / CEC / GEMS VI / ErP ( Lot 7 ) / CoC Tier 2**

## 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)<br>( ac source chroma 6530 )               |
| 2.5 Efficiency        | Eff <sub>(av)</sub> ≥ 89 % (at 115 Vac & 230 Vac)<br>Eff ≥ 79 % (at 115 Vac & 230 Vac, 10% load) |
| 2.6 Power consumption | Pi ≤ 0.15 W (at 115 Vac & 230 Vac, no load)  |
| 2.7 Power factor (PF) | PF ≥ 0.9 (at full load)  |

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

E<sub>1</sub>=efficiency with 25% rated load , E<sub>2</sub>=efficiency with 50% rated load  
E<sub>3</sub>=efficiency with 75% rated load , E<sub>4</sub>=efficiency with 100% rated load

## 3. Output :

|               |                |   |
|---------------|----------------|---|
| 3.1 DC output | Voltage        | +53.0 V ± 5%                            |
|               | Current        | 1.69 A max.                             |
|               | Regulation     | 50.3 V min. ~ 53.0 V typ. ~ 55.7 V max. |
|               | Ripple & Noise | 530 mV <sub>p-p</sub> max.              |
|               | Total power    | 89.6 W max.                             |

Remark : For ripple & noise measurement , use a 20 MHz bandwidth frequency oscilloscope , and add a 0.1 μF 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)     | Vout * 150% max., latch off.    |
| 4.2 Over Current Protection (OCP)     | Iout * 170% max., autorecovery. |
| 4.3 Short Circuit Protection (SCP)    | Autorecovery.                   |
| 4.4 Over Temperature Protection (OTP) | Latch off.                      |

## 5. Safety and EMC requirement :

### 5.1 Safety requirement

a. Safety : PSE

b. Dielectric strength : Cut off current 10 mA

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

c. Insulation resistance :

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

5.2 EMC requirement :

5.3 Leakage current : Less than 3.5 mA

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. : 300,000 Hrs. (calculated hours at 25 °C , by Telcordia SR-332)

## 8. Mechanical :

8.1 Weight : 460 g Ref.

8.2 Cable type : Black UL 1185 18AWG  
(wire + plug)

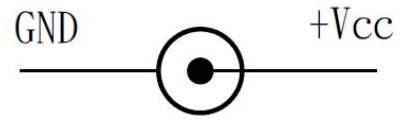
Plug :  $\phi 6.5 * \phi 4.3 * 1.4 * 9.5$  mm  
(EIAJ-5)

8.3 Cable length : 1500 mm

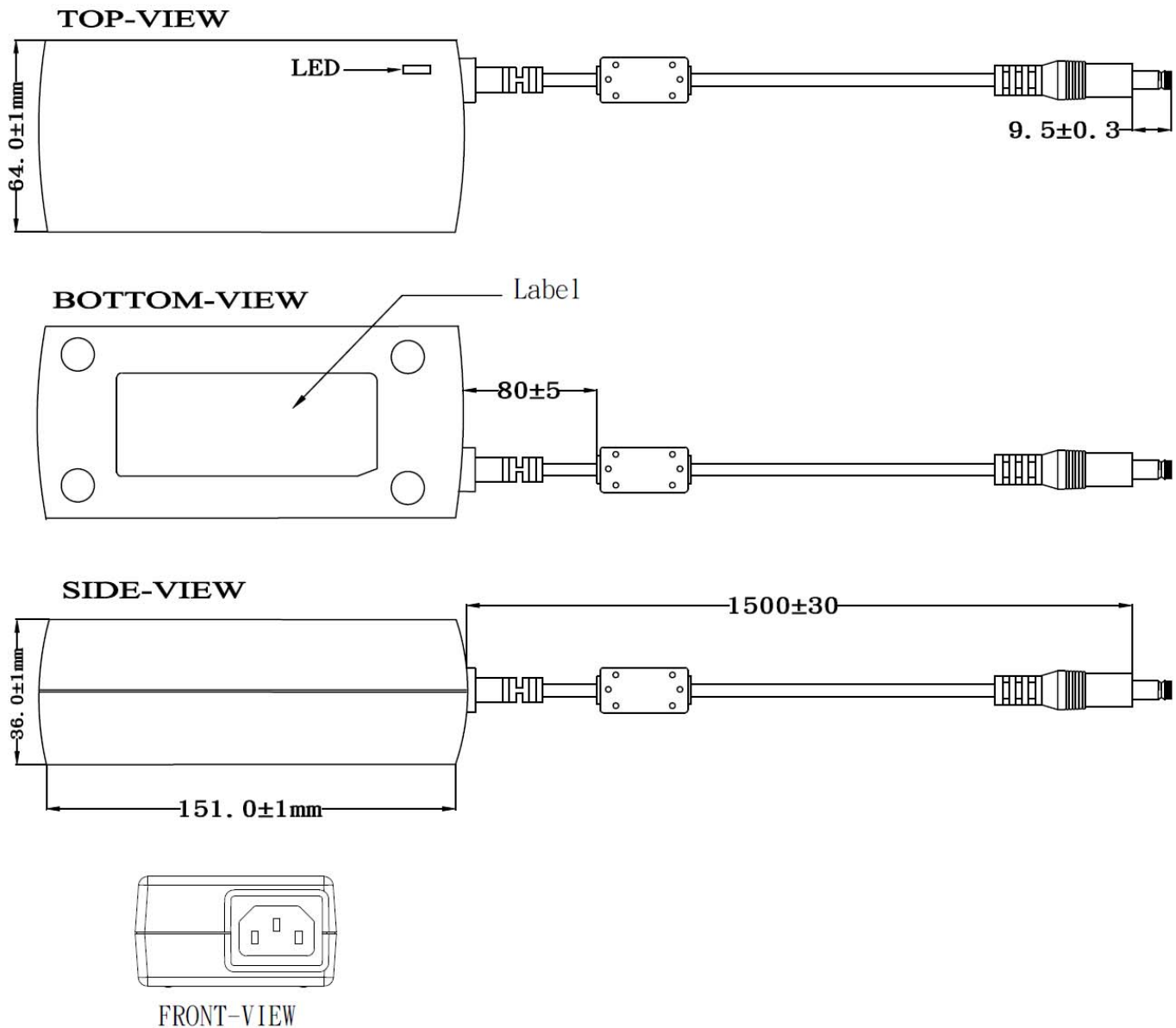
8.4 Case dimension : 139.0 (L) \* 61.0 (W) \* 36.0 (H) mm  $\pm 1$  mm

8.5 Material flammability : UL 94V-0

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



Output cable plug pin assignment



## 9. Label :

- 9.1 Label materials : Metalized polyester label (silver gloss)
- 9.2 Color : Black background with silver printing
- 9.3 Label dimension : 91.5 (L) \* 29.3 (W) +/-0.1 mm
- 9.4 Label thickness : 75#

100%



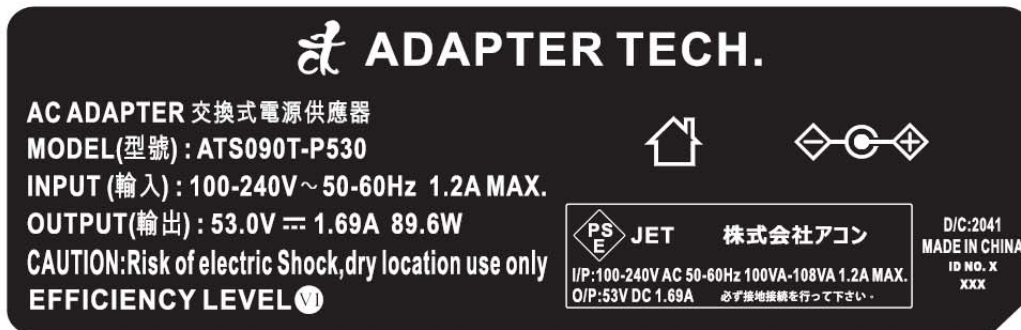
"XXX"

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

ID NO. "X"

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

160%





## A. Line regulation test

Test result :

| Test condition      | Spec.           | Reading 1 | Reading 2 | Reading 3 |
|---------------------|-----------------|-----------|-----------|-----------|
| 90 Vac / 50 % Load  | 50.3 V ~ 55.7 V | 53.02 V   |           |           |
| 115 Vac / 50 % Load | 50.3 V ~ 55.7 V | 53.02 V   |           |           |
| 132 Vac / 50 % Load | 50.3 V ~ 55.7 V | 53.02 V   |           |           |
| 180 Vac / 50 % Load | 50.3 V ~ 55.7 V | 53.02 V   |           |           |
| 230 Vac / 50 % Load | 50.3 V ~ 55.7 V | 53.02 V   |           |           |
| 264 Vac / 50 % Load | 50.3 V ~ 55.7 V | 53.02 V   |           |           |

## B. Efficiency test

Test result :

| Test condition  | Spec.     | Reading 1 | Reading 2 | Reading 3 |
|-----------------|-----------|-----------|-----------|-----------|
| 115 Vac         | 89 % min. | 90.61 %   |           |           |
| 230 Vac         | 89 % min. | 89.76 %   |           |           |
| 230Vac@10% load | 79 % min. | 84.82 %   |           |           |

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

$E_1$ =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   | 50.3 V ~ 55.7 V | 53.11 V   |           |           |
| 115 Vac / 50 % Load  | 50.3 V ~ 55.7 V | 53.02 V   |           |           |
| 115 Vac / 100 % Load | 50.3 V ~ 55.7 V | 52.91 V   |           |           |
| 230 Vac / 0 % Load   | 50.3 V ~ 55.7 V | 53.11 V   |           |           |
| 230 Vac / 50 % Load  | 50.3 V ~ 55.7 V | 53.02 V   |           |           |
| 230 Vac / 100 % Load | 50.3 V ~ 55.7 V | 52.92 V   |           |           |

## D. Ripple & Noise test

Test result :

| Test condition       | Spec.                      | Reading 1              | Reading 2 | Reading 3 |
|----------------------|----------------------------|------------------------|-----------|-----------|
| 115 Vac / 100 % Load | 530 mV <sub>p-p</sub> max. | 45.3 mV <sub>p-p</sub> |           |           |
| 230 Vac / 100 % Load | 530 mV <sub>p-p</sub> max. | 35.5 mV <sub>p-p</sub> |           |           |





## E. Inrush current

Test result :

| Test condition       | Spec.     | Reading 1 | Reading 2 | Reading 3 |
|----------------------|-----------|-----------|-----------|-----------|
| 230 Vac / 100 % Load | 80 A max. | 65.7 A    |           |           |

## F. Over voltage protection

Test result :

| Test condition       | Spec.           | Reading 1 | Reading 2 | Reading 3 |
|----------------------|-----------------|-----------|-----------|-----------|
| 115 Vac / 100 % Load | Vout*150 % max. | 126 %     |           |           |
| 230 Vac / 100 % Load | Vout*150 % max. | 127 %     |           |           |

## G. Over current protection

Test result :

| Test condition | Spec.           | Reading 1 | Reading 2 | Reading 3 |
|----------------|-----------------|-----------|-----------|-----------|
| 115 Vac        | Iout*170 % max. | 127 %     |           |           |
| 230 Vac        | Iout*170 % max. | 126 %     |           |           |

## H. Short circuit protection

Test result :

| Test condition | Spec.         | Reading 1 | Reading 2 | Reading 3 |
|----------------|---------------|-----------|-----------|-----------|
| 115 Vac        | Auto recovery | Ok        |           |           |
| 230 Vac        | Auto recovery | Ok        |           |           |

## I. Input power consumption (no load)

Test result :

| Test condition     | Spec.         | Reading 1 | Reading 2 | Reading 3 |
|--------------------|---------------|-----------|-----------|-----------|
| 115 Vac / 0 % Load | $\leq 0.15$ W | 0.11 W    |           |           |
| 230 Vac / 0 % Load | $\leq 0.15$ W | 0.14 W    |           |           |

## J. Power factor

Test result :

| Test condition       | Spec.      | Reading 1 | Reading 2 | Reading 3 |
|----------------------|------------|-----------|-----------|-----------|
| 115 Vac / 100 % Load | $\geq 0.9$ | 0.99      |           |           |
| 230 Vac / 100 % Load | $\geq 0.9$ | 0.95      |           |           |



## Efficiency Test Report

- A. Model Number** : ATS090T-P530 (53.0V / 1.69A / 89.57W)
- B. DC Power Cord** : UL1185, 18AWG, L=1500mm
- 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 Equipment**
- a. AC Power Source : " EXTECH " 6600
  - b. Electronic Load : " PRODIGIT " 3356
  - c. Power Meter : " YOKOGAWA " WT-210
  - d. Digital Meter : " FLUKE " 45  
0.777546957
- F. AC Input Voltage** : 115Vac/60Hz

| Load Conditions                 | Reported Quantity    |                     |                     |                     |                     |                    |
|---------------------------------|----------------------|---------------------|---------------------|---------------------|---------------------|--------------------|
|                                 | 100%* I <sub>0</sub> | 75%* I <sub>0</sub> | 50%* I <sub>0</sub> | 25%* I <sub>0</sub> | 10%* I <sub>0</sub> | 0%* I <sub>0</sub> |
| Rms Output Current (mA)         | 1690mA               | 1268mA              | 845mA               | 405mA               | 169mA               | 0mA                |
| Rms Output Voltage (V)          | 52.910V              | 52.980V             | 53.020V             | 53.070V             | 53.100V             | 53.110V            |
| Active Output Power (W)         | 89.42W               | 67.15W              | 44.80W              | 21.47W              | 8.97W               | 0.00W              |
| Rms Input Voltage (V)           | 115V                 | 115V                | 115V                | 115V                | 115V                | 115V               |
| Rms Input Current (A)           | 866.10mA             | 650.00mA            | 441.60mA            | 418.70mA            | 200.15mA            | 44.27mA            |
| Rms Input Power (W)             | 98.34W               | 73.68W              | 49.57W              | 23.62W              | 10.07W              | 0.11W              |
| T.H.D. of the input current (%) | 9.4%                 | 11.3%               | 14.5%               | 174.1%              | 193.1%              | 7.9%               |
| True Power Factor (PF)          | 0.99                 | 0.99                | 0.98                | 0.49                | 0.44                | 0.03               |
| Power Consumed by UUT (W)       | 8.92W                | 6.53W               | 4.77W               | 2.15W               | 1.10W               | 0.11W              |
| Efficiency                      | 90.93%               | 91.14%              | 90.38%              | 90.91%              | 89.12%              | -                  |
| Average Efficiency              | 90.84%               |                     |                     |                     | 89.12%              | -                  |

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

| Load Conditions                 | Reported Quantity    |                     |                     |                     |                     |                    |
|---------------------------------|----------------------|---------------------|---------------------|---------------------|---------------------|--------------------|
|                                 | 100%* I <sub>0</sub> | 75%* I <sub>0</sub> | 50%* I <sub>0</sub> | 25%* I <sub>0</sub> | 10%* I <sub>0</sub> | 0%* I <sub>0</sub> |
| Rms Output Current (mA)         | 1690mA               | 1268mA              | 845mA               | 405mA               | 169mA               | 0mA                |
| Rms Output Voltage (V)          | 52.920V              | 52.970V             | 53.020V             | 53.070V             | 53.090V             | 53.110V            |
| Active Output Power (W)         | 89.43W               | 67.14W              | 44.80W              | 21.47W              | 8.97W               | 0.00W              |
| Rms Input Voltage (V)           | 230V                 | 230V                | 230V                | 230V                | 230V                | 230V               |
| Rms Input Current (A)           | 447.80mA             | 349.60mA            | 251.71mA            | 260.69mA            | 146.62mA            | 72.44mA            |
| Rms Input Power (W)             | 98.17W               | 74.60W              | 50.71W              | 24.00W              | 10.49W              | 0.14W              |
| T.H.D. of the input current (%) | 22.4%                | 28.7%               | 37.2%               | 215.7%              | 250.0%              | 180.0%             |
| True Power Factor (PF)          | 0.95                 | 0.93                | 0.88                | 0.40                | 0.31                | 0.01               |
| Power Consumed by UUT (W)       | 8.74W                | 7.46W               | 5.91W               | 2.53W               | 1.52W               | 0.14W              |
| Efficiency                      | 91.10%               | 90.00%              | 88.35%              | 89.47%              | 85.53%              | -                  |
| Average Efficiency              | 89.73%               |                     |                     |                     | 85.53%              | -                  |