

APPROVAL SHEET



| | | |
|------------------|---|------------------|
| MODEL | : | ADP-60KD BA |
| CUSTOMER | : | Advantech |
| CUSTOMER PART NO | : | 96PSA-A60W12V1-4 |
| DATE | : | Aug. 29, 2023 |

| | | |
|------------------|-------------------------|-----------------------------|
| DELTA P/N | ADP-60KD BA | SHEET 1 OF 1 |
| CONTENT | Revision History | DATE Aug / 29 / 2023 |

1.Revision History

| NO. | DESCRIPTION | ENGINEER | DATE |
|-----|--|-----------|------------|
| 00 | Item 2.1.1 Add PD curve Item 2.2.1 Add PSU -10°C operating contion | Niol Tsai | 01/08/2020 |
| 01 | Modify spec as below: Item 2.3.1 L-N :4KV Item 2.4 ESD air discharge :12KV | Niol Tsai | 03/05/2020 |
| 02 | Add Item 2.11 Safety Standard: IEC 62368-1 3rd 1. Z1 material change for meet IEC 62368 3rd 2. PWB change for meet new Z1 block | Niol Tsai | 08/29/2023 |

1. ELECTRICAL

1.1 Input Characteristics:

1.1.1 Nominal Voltage

It is normal for **100 ~ 240Vac** input AC voltage.

1.1.2 Input Voltage Range

The Adapter shall operate from **90 ~ 264Vac**.

1.1.3 Rated Frequency

It is normal for **50Hz** or **60Hz** and single phase.

1.1.4 Frequency Range

The Adapter shall operate with an input frequency from **47 Hz** to **63 Hz**.

1.1.5 Input Current

1.7A Max at **90Vac** input voltage.

1.1.6 Inrush Current Limit (cold start)

No damage; shall be limited to a 22% margin of the I2t rating of the input fuse

1.1.7 Efficiency (Warm Up)

1.1.7.1 **84 %** min. at nominal input voltage, maximum load and measured at the end of DC cable.

1.1.7.2 Active mode efficiency:

More than **88%** of average efficiency of **25%,50%,75%** and **100%** load tested at **115Vac** and **230Vac**. (Warm up after 30 minutes)

1.1.8 Small Load Power Consumption

Vin=115Vac/60Hz and 230Vac/50Hz

| | |
|----------------|-------------------|
| Output load(W) | Input power (max) |
| 0W | 0.15W |



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ADP-60KD B

| | | | | | |
|----------|-------|-------------|-------------|------------------------------------|------|
| Date | Drawn | Design (EE) | Design (ME) | DOCUMENT NAME. : ES-60KD SERIES | REV. |
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| | |
|-------|------|
| 0.25W | 0.5W |
| 0.5 | 1W |
| 1W | 1.7W |
| 1.5W | 2.4W |

1.2 Output Characteristics:

1.2.1 Rated Voltage

The rated output voltage is specified at **12V**.

1.2.2 Voltage Range

The output voltage will be performed **11.4V~ 12.6V** when the load is **0A ~ 5A** steadily.

1.2.3 Current

This Adapter can work from **0A to 5A** and output voltage is in section 1.2.2 specified range.

1.2.4 Output Ripple and Noise

Output ripple voltage is **300 mV** peak to peak or less.

Measured methods:

T1. Performed by **20M** Hz bandwidth in oscilloscope.

T2. Applied **0.1uF** high frequency capacitor and **10uF** electrolytic capacitor across output connector terminals.

T3. Measured at the end of DC cable.

1.2.5 Turn On delay time

The Adapter shall switch on in less than **5 seconds** at input voltage is 90Vac.

1.2.6 Hold -up time

The output voltage shall be sustained **10mS** within regulation requirement after loss 115Vac and 80% of maximum load.



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1.2.7 Rise time

DC output rise time from 10% to 90% of output voltage shall be less than **100ms** at nominal line and maximum load

1.2.8 Load transient response

The adapter must within regulation when applied a step load from 0% to 50% and 50% to 100% load at **1.0A/us** slew rate and frequency is 1Hz to 5KHz

The output voltage will be performed **11.4V~ 12.6V**.

1.2.9 Over-shoot

The output overshoot shall be less than **14V**

1.2.10 Protection

1.2.10.1 Over Voltage Protection

The output shall be protected to latch off at over-voltage condition, maximum value can't be over **18V**.
That might be return to normal state by AC reset . .

1.2.10.2 Over Current Protection

The output shall be protected to latch off at over-current condition , OCP must be **less than 8A**.
That might be return to normal state by AC reset ..

1.2.10.3 Short Circuit protection

Output can be shorted without damage. The adaptor shall be protected to latch off .
That might be return to normal state by AC reset ..

1.2.10.4 Over Temperature Protection

No deformation and no discoloration on case and will be shut down. The case temperature < 95Deg C.
That will be return to normal state by ac reset.



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1.2.11 Capacitance load

Plugging a 1000uF capacitance to a live adapter, adapter can not shut down.

2. Environmental

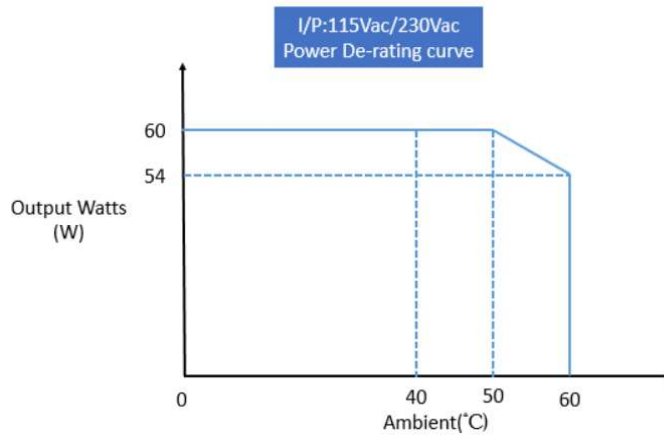
2.1 Temperature

2.1.1 Operating

The AC Adapter shall be capable of operating at full load with an ambient temperature range of **0 °C to +40°C**.

PSU shall turn on normally with input 115Vac/230Vac and full load condition after putting the PSU into -10°C chamber for 8hrs.

It shall be capable of operating with below PD curve.



2.1.2 Shipping/Storage

The AC Adapter shall be capable of withstanding ambient temperature from **-20°C to +85°C**.

2.2 Humidity



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2.2.1 Operating

The AC Adapter shall be capable of operation in relative humidity of **8% to 95%** relative humidity, non-condensing.

2.2.2 Shipping/storage

The AC Adapter shall be capable of withstanding ambient relative humidity of **5% to 95%** relative humidity, non-condensing.

2.3 Immunity

2.3.1 Lightning Surge Immunity

This is to follow the norm of IEC-61000-4-5 Level 3 requirements

L-N 4KV/1.2 * 50uS 5 times No damage.

L-FG 6KV/1.2 * 50uS 5 times No damage.

2.3.2 Electric Fast Transients (EFT)

This is to follow the norm of IEC-61000-4-4/1995

(EN 61000-4-4) Level 2(1KV) requirements

2.4 Electrostatic Discharge (ESD)

This Adapter is capable to withstand ESD test voltage at any point around the enclosure as below.

(Refer to IEC61000-4-2)

±12KV air discharge No damage.

±8KV contact discharge No damage.

2.5 Dielectric Withstand Voltage (HI – POT)

100% of line products of this Adapter shall be applied 3000Vac for 1 seconds between AC input terminals and output terminals. Cut off current is 10mA.

2.6 Leakage Current :



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The AC leakage current is less than **100 μ A** when adapter is connected to **250Vac/50Hz** at normal condition.

2.7 Insulation Resistance

The insulation resistance shall be not less than **20M** ohms after application of **500Vdc/10mA for 1 minute**.

2.8 Electromagnetic Interference (EMI)

2.8.1 The adapter shall comply with the following national standards.

(a) CISPR 22 Class B

(b) VCCI Class B

(c) FCC

2.9 MTBF

2.9.1 MTBF(Mean-Time-Between-Failures)Calculation

The calculated MTBF shall be **100,000** hours of continuous operation at **25°C**, maximum load and normal voltage.

2.10 Surface Temperature rise

Output 60W and ambient 25°C;Input voltage 100Vac/60Hz Iout=5A ,
case temperature rise $\leq 45^{\circ}\text{C}$

2.10 Cap Life

The lifetime is least 30000 hours in Full load at 25°C at 100Vac/60Hz and 240Vac/50Hz .

2.11 Safety Standrad

IEC 62368-1 3rd

3. Mechanical

3.1 Outline Dimension: **120.0*52.5*32.5 mm**, Color: **Black**

3.2 AC Inlet Type: Socket C14 type



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3.3 DC Cable Length:

TYPE: UL 1571 17AWG

ADP-60KD BA---LENGTH: 1500 mm

ADP-60KD BC---LENGTH: 1200 mm

ADP-60KD BD/BE/BF/BG---LENGTH: 1500 mm

3.4 DC Connector Dimension:

ADP-60KD BA

OD=5.5mm ,ID=2.5 ,Length=11.0mm

ADP-60KD BC

OD=5.5mm ,ID=2.5 ,Length=11.0mm

ADP-60KD BD

OD=5.5mm ,ID=2.5 ,Length=9.9mm(LOCKABLE)

ADP-60KD BE

4 PIN DIN 連接器

ADP-60KD BF

鳳凰頭連接器

ADP-60KD BG

OD=5.0mm ,ID=2.1 ,Length=9.9mm(LOCKABLE)



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