

# APPROVAL SHEET




MODEL	:	ADP-36PH BBH
CUSTOMER	:	Advantech
CUSTOMER PART NO	:	96PSA-A36W12R1-3
DATE	:	Mar. 12, 2020

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08/20'19	王玉玲	張志陽	莊英辰	<b>ES-36PH BBH</b> REV. 00


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## 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

**1A** Max at **100Vac** input voltage.

#### 1.1.6 Inrush Current Limit (cold start)

No damage at 240Vac.

#### 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.

(Warm up )


1.1.7.2 Active mode efficiency(Warm up after 30min):

(1)More than **87.4%** of average efficiency of **25%,50%,75%** and **100%** load tested at **115Vac**

(2)More than **84.78%** of average efficiency of **25%,50%,75%** and **100%** load tested at **230Vac**

#### 1.1.8 No Load Power Consumption

Maximum non-load power consumption is less than 0.1W at 115Vac/60Hz and 230Vac/50Hz

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1.1.9 Power saving requirement

Vin : 100Vac/50Hz , 100Vac/60Hz , 115Vac/60Hz , 230Vac/50Hz

DC POWER(W)	AC Spec. Power ( W )
17.7	<=22
11	<=14
1.5	<=2.4
1	<=1.7
0.3	<=1.0

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 **11.4 ~ 12.6V** when the load is **0A ~ 3.0A** steadily.

1.2.3 Current

This Adapter can work from **0 A** to **3.0A** and output voltage is in section 1.2.2 specified range.

1.2.4 Output Ripple and Noise

Output ripple voltage is **450 mV** peak to peak

Measured methods:

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


T2. Applied **0.1uF** high frequency capacitor and **47uF** electrolytic capacitor across output connector terminals

T3. Measured at the end of DC cable.

T4. 47Hz and 63Hz tested at 90Vac and 264Vac.

1.2.5 Turn On delay time

The Adapter shall switch on in less than **5 seconds** at input voltage is 100-240Vac.

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### 1.2.6 Hold –up time

The output voltage shall be sustained **5mS** within regulation requirement after loss 100Vac and maximum load.

### 1.2.7 Rise time

DC output rise time from 10% to 90% of output voltage shall be less than **30mS** at nominal line and maximum load

### 1.2.8 Load transient response

The adapter must within regulation when applied a step load from 0.1~1.5A & 1.5A~3A load at 2.5A/us slew rate , 50% Duty cycle , Frequency be operated 100Hz ~ 10KHz

The output voltage will be performed **11.3~12.7V**.

### 1.2.9 Protection

#### 1.2.9.1 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 . The reset time must less than 2min .

#### 1.2.9.2 Over Current Protection

The maximum constant current shall be more than **3.0A** and be less than **5.5A** at 90Vac and 264Vac. **The adaptor shall be auto-recovery.**

#### 1.2.9.3 Short Circuit protection

Output can be shorted without damage. The adaptor shall be auto-recovery. (It will enter into normal condition when the fault condition is removed.)

#### 1.2.9.4 Over Temperature Protection

No deformation and no discoloration on case and will be shut down. That will be return to normal state by ac reset.



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## 2. Environmental

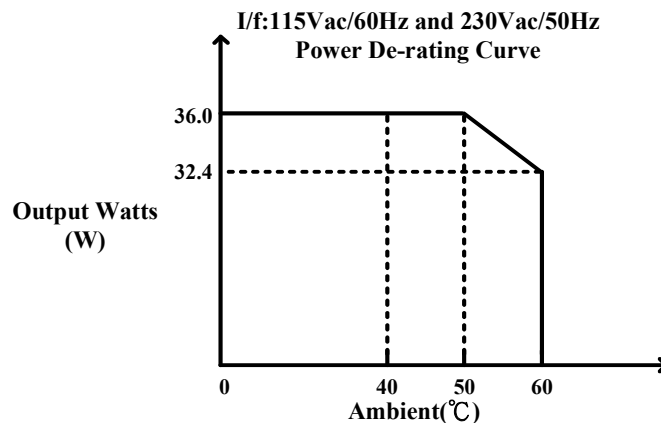
### 2.1 Temperature

#### 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**.

Adapter shall turn on normally with input 115Vac/230Vac and full load condition after putting the Adapter into **-20°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 **-30°C to +80°C**.

### 2.2 Humidity

#### 2.2.1 Operating

The AC Adapter shall be capable of operation in relative humidity of **8% to 90%** relative humidity,

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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-1000-4-5 Level 3 requirements

L-N 1KV/1.2 \* 50uS 5 times No function error.

### 2.3.2 Electric Fast Transients(EFT)

This is to follow the norm of IEC-1000-4-4/1995

(EN 61000-4-4) Level 3 requirements

## 2.4 Electrostatic Discharge (ESD)

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

±15KV air discharge No damage.

±8KV contact discharge No damage.

## 2.5 Surface Temperature rise

Output 36W and ambient **40°C**;input voltage 100Vac/240Vac case temperature rise  $\leq 45^{\circ}\text{C}$ .

## 2.6 Dielectric Withstand Voltage (HI – POT)

Between AC input and secondary AC 3KV test time 1 minute; 100% of line products of this Adapter shall be applied 3000Vac for 2 seconds between AC input terminals and output terminals. Cut off current 3mA.

## 2.7 Leakage Current

The measured reading is less than 100uA at 240 Vac, 50Hz.

## 2.8 Insulation Resistance



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The insulation resistance shall be not less than **30M** ohms after application of **500Vdc/10mA for 1 minute**.

## 2.9 Electromagnetic Interference (EMI)

The adapter shall comply with the following national standards.

- (a) FCC Class B
- (b) CISPR 22 Class B
- (c) VCCI Class B

## 2.10 MTBF

### 2.10.1 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.

### 2.10.2 MTBF Verification

The MTBF shall be verified from life testing performed by factory Quality department.

The operating conditions are:40°C ambient temperature, sea level ,both nominal line voltage ranges(110VAC or 220VAC) and a minimum load of **75%** of the maximum load.

## 2.11 Altitude

The AC Adapter shall be capable of operation less than altitude 5000m.


## 2.12 E-cap life

E-cap life should meet 43800 hours at 25°C nominal input voltage.

## 3. Mechanical

3.1 Outline Dimension: **89.5\*37.0\*26.5** mm, Color: **Black**

3.2 AC Inlet type: Socket **C6** type

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3.3 DC Cable :

TYPE:UL 1571 17AWG

LENGTH : 1500mm

3.4 DC Connector Dimension:

Model Name	OD	ID	PLUG LENGTH
<b>ADP-36PH BBH</b>	5.5 mm	2.5 mm	11.0 mm



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