| REV. | Description | Date |
|---|---|---|
| 00 | 102A-239221<br>UPDATE 機構 bending 測試條件<br>(ADP-240EB BH 的 ES 從 ADP-240EB B SERIES 文件拉開,重新發行) | 09/27’23 |
| 01 | 102A-239274<br>ADD MODEL: ADP-240EB BJ | 10/04’23 |
| 02 | 102A-243227<br>Update item 6.7 Plug P/N<br>ADP-240EB BH PLUG: ACES 56920-02022-102<br>ADP-240EB BJ PLUG: ACES 56923-02022-101 | 03/22’24 |
| 03 | 102A-243269<br>Item 6.7 ADP-240EB BH Plug P/N CHANGE FROM ACES 56920-02022-102 TO ACES 56923-02022-101 | 03/26’24 |
| 04 | 102A-245133<br>CHANGE ITEM 6.6 Adapter Weight<br>ADP-240EB BJ 表格須獨立出來一列, 重量 Weight 525.0g±2.5% | 05/13’24 |
| 05 | 102A-245192<br>UPDATE ITEM 2.2.8 Power saving requirement<br>UPDATE ITEM 2.2.10 Peak load | 05/17’24 |
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| 台達電子工業股份有限公司<br>DELTA ELECTRONICS, INC. | | | | DESCRIPTION :<br>電氣規格 (Electrical Specification) | |
| THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF DELTA ELECTRONICS, INC. AND SHALL NOT BE REPRODUCED OR USED AS THE BASIS FOR THE MANUFACTURE OR SELL OF APPARATUSES OR DEVICES WITHOUT PERMISSION. | | | | MODEL NO. :<br>ADP-240EB BXX SERIES | |
| Date | Drawn | Design (EE) | Design (ME) | DOCUMENT NAME. :<br>ES-240EB BXX SERIES | REV.<br>05 |
| 05/17’24 | 王玉玲 | 顏偉任 | 陳俊豪//張伯毅 | | |

## FOR MODEL: ADP-240EB BH/BJ

# 1. Introduction:

This specification define the input, output, performance characteristics, environment, noise and safety requirements for the power supply.

# 2. Electrical Requirements:

## 2.1 Input Requirements:

2.1.1 Input Voltage
-Normal voltage: 100~240Vrms
-Voltage Range: 90~264Vrms

2.1.2 Input Frequency
-Normal Frequency: 50~60Hz
-Frequency Range: 47~63Hz

2.1.3 Input Current
-Under 3.5 Arms at 100Vac & Max. load

2.1.4 Configuration
-3 Conductors (Line, Neutral, Ground,)

2.1.5 Input Fuse
-An adequate internal fuse on the AC input line shall be provided.

2.1.6 Inrush Current
-The inrush current of the power supply shall be less than the rating of its critical components (include bridge diode, surge limiting device) for all condition of line voltage of 2.1.1
-The I^2t shall less than 22% of the fuse, surge limiting device and bridge diode rating.

2.1.7 Efficiency
-The power supply shall meet DOE VI & COC V5 Tier 2 request.
-Four point average efficiency at 25%,50%.75% and100% loading shall be more than 89% after burn in 30 minutes measure at 115V/60Hz and 230Vac/50Hz
-The efficiency at 10% loading shall be more than 79% measure at 115V/60Hzand 230Vac/50Hz

2.1.8 Power Factor
-0.9 min @ full load at input AC power 230Vac.
-With active PFC function to meet EN61000-3-2 harmonic current requirement.

2.1.9 Primary Aluminum Capacitor
- 450Vdc (min.)

## 2.2 Output Requirements:

2.2.1 Electrical

| No. | Item | Condition | Specification |
|---|---|---|---|
| 1 | Output Voltage | Rating | 20V |
| | | Output Voltage Range | 19~21V |
| | | Ripple & Noise | 350mV |
| 2 | Output Load Current | Operation Max. | 12A |
| | | Operation Min. | 0A |
| 3 | 2) Transient Load Current | Current | 0.05~12A |
| | | Transient Frequency | 100Hz ~ 100KHz |
| | | Slew rate | 2.5A/us |

2) The output voltage regulation shall less than( +/-5% )of the rated output voltage in transient mode.

2.2.2 Output Voltage Requirement
-The total output voltage regulation shall be meet the spec., including the effects of AC line voltage variation, load current, ripple and noise.
-The effect of transient load changes is included in this limit.

2.2.3 Overshoot
-The output overshoot at turn on shall not exceed 21 voltage value with or without the load connected.

2.2.4 Hold Up Time
-The power supply shall maintain voltage regulation within the specified limits in paragraph 2.2.1 for at least 16ms after lost of input voltage measure at 100Vac and at maximum output load.

2.2.5 Output Rise Time
-At turn on the rise time of output voltage shall be less than 40ms.
*Measured from the 10% point to the 90% point of the normal.

2.2.6 Turn On Delay Time
-No Load Power Consumption supply shall reach voltage regulation within the specified limits in table 2.2.1 for 3sec max. after AC input the power supply.
-The input voltage measure at 100/240Vac and at maximum output load.

2.2.7 No Load Power Consumption
-Maximum non-load power consumption is less than 0.15W at 115Vac/60Hz and230Vac/50Hz

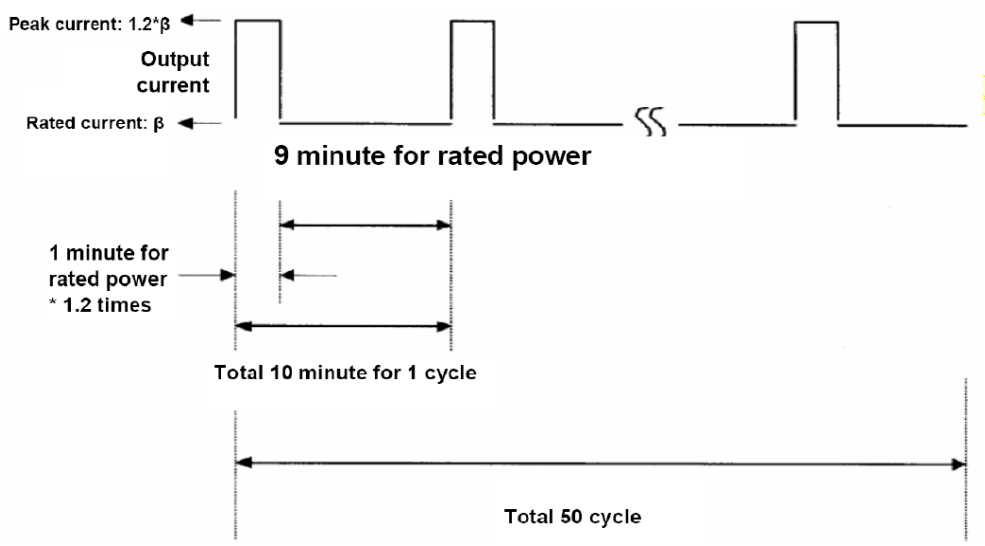
2.2.8 Power saving requirement

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

| Output Power (W) | Pin Power (W) |
|---|---|
| 18 | < 23.5 |
| 5~6.5W | Eff. > 80% |
| 11 | <14 |
| 3 | < 5 |
| 1.65 | < 3 |
| 1.5 | < 2.2 |
| 1 | < 1.6 |
| 0.25 | <0.45 |

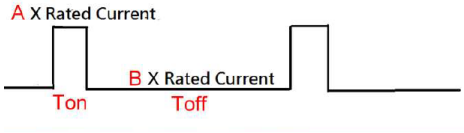
2.2.9 Surge load:

The adapter shall support a surge load with 120% of maximum load for 1min ,maximum load for 9min and Output Voltage more than 18.5V at input voltage is 100-240Vac




2.2.10 Peak load:

The adapter shall support below loading condition without any damage, safety issues and protection happen (OTP is allow). The output voltage shall more than 18.3V at input voltage is 100-240V/50Hz .




| Spec | Ton | Toff | A | B |
|---|---|---|---|---|
| 1 | 2ms | 18ms | 200% | 90% |
| 2 | 1.5ms | 13.5ms | 225% | 87.5% |

2.2.11 Hot Plugging:

Plugging a live AC adapter into the system with 2000 uF capacitance shall not trigger any protections or cause the adapter to shut down

## 2.3 Power Output Protection:

2.3.1 Over Current Protection (OCP)

-The maximum constant current shall be less than 14.4~18A at 90Vac and 264Vac.

-The adapter Shall be Latch off and no component damage.

2.3.2 Over Voltage Protection (OVP)

-The output shall be protected to latch off at over-voltage condition,maximum value can't be over 27V.

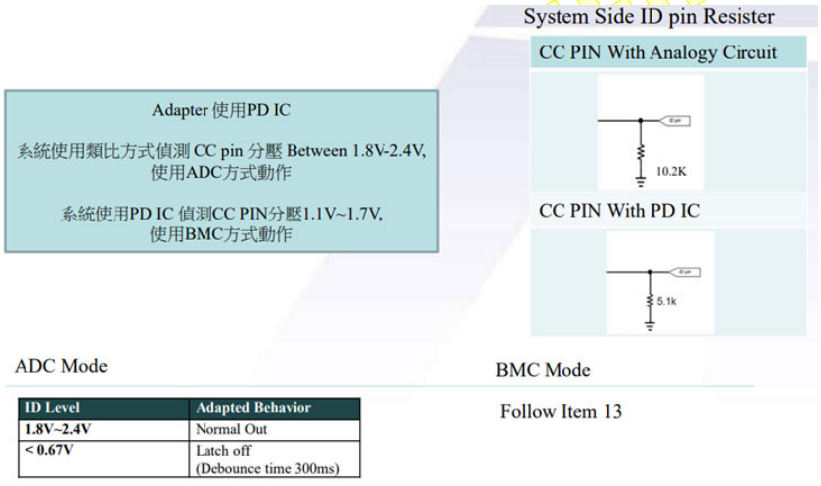
2.3.3 Short Circuit Protection (SCP)

-The power supply short output shall be Latch off and no component damage.

2.3.4 Over Temperature Protection (OTP)

-The adapter shall be Latch off and no component damaged, no fire and no melting of the enclosure.

2.3.5 DC Plug OTP




| ID Level | Adapted Behavior |
|---|---|
| 1.8V~2.4V | Normal Out |
| < 0.67V | Latch off (Debounce time 300ms) |

## 3. Reliability:

### 3.1 MTBF:

-The power supply shall be designed and produced to have a MTBF of 150,000 operation hours at 90% confidence – level while operating under the following condition

-AC input voltage: 100 and 240Vrms

-Ambient Temp. :25℃

### 3.2 Life/Power On Hours

The lifetime is least 26280 hours in Full load at 25℃at 100Vac/60Hz and 240Vac/50Hz on bakelite.

### 3.3 Burn-in Test Condition

- More than 4 hours at 35°C, normal input voltage.
- AC on/off must be tested.

### 3.4 Surge Voltage (For DT Type Only)

1. 264Vac to 400Vac for 1 min
2. 264Vac to 430Vac for 2sec
3. Bulk Cap : 450Vdc

## 4. Safety & EMC:

### 4.1 Safety Certificate

- The power supply unit shall be tested with the following safety standard (IEC60950) & (IEC62368-1 2nd).
- Certificate : Follow safety control table

-Trade mark: ASUS

### 4.2 Insulation Resistance

- Insulation resistance shall be > 30M ohm at 500Vdc between primary Live, Neutral and secondary.

### 4.3 Hi-Pot Test

-Primary to Secondary : 3.0KVac or 4242Vdcfor 1minute
-Primary to FG :1.5KVac for 1minute

### 4.4 Leakage Current

-The power supply leakage current shall be less than 110 uA.@240Vac/50Hz
-Test with AC cable 80cm

### 4.5 Surge & Impulse Test

-Lighting Surge : ±1.5KV (L-N) ; ± 2.5KV (L-FG; N-FG)
-Impulse Noise Test: 1KV

### 4.6 EMI standard

-The power supply shall comply with a following RFI/EMI standards when tested in asystem configuration.
-F.C.C part15
-CISPR 32 class B
-The limits shall be met with a margin more than 6dB at all applicable.

### 4.7 Electrostatic Discharge (ESD)

This Adapter is capable to withstand ESD test voltage at any point around the enclosure as below.
±15KV air discharge Performance Criterion A
±8KV contact discharge Performance Criterion A.



## 5. Environment Requirements:

### 5.1 Temperature

-Operation: 0~35°C; Storage: -30~80°C

### 5.2 Humidity (no condensing)

-Operation: 5~90%; Storage: 5~90%

### 5.3 Surface Temperature rise

- Output 240W and ambient 25℃; input voltage 100Vac/240Vac 50Hz Top case temperature rise<45℃,Bottom case temperature rise<50℃

### 5.4 Acoustic test:

**Input Condition**

90V/63Hz & 254V/47Hz

**Load Condition:**

Dynamic load: 0.05~12A at 100Hz and 100KHz

static load(from 0A to full load,0.1A pre step)

**NB ADAPTER SPEC :**

**Static Load**

Desktop Type : Microphone at a distance of 5cm from the surface and noise level is less than 20dB

**Dynamic Load**

Desktop Type : Microphone at a distance of 5cm from the surface and noise level is less than 25dB

## 6. Mechanical Requirements:

6.1 Outline Dimension: 165.0*76.0*25.4mm, Color: Black

6.2 AC Inlet type: Socket C14 type

6.3 DC Cable Length:

| Model Name | Length |
|---|---|
| ADP-240EB BH/BJ | 1200±50 |

6.4 DC Cable Type:

| Model Name | Wire |
|---|---|
| ADP-240EB BH/BJ | UL20276 14AWG |

6.5 DC Connector Dimension:

| | Item | | | | |
|---|---|---|---|---|---|
| Model Name | Plug Molding Shape | Outside Dimension (-) | Inside Dimension (+) | ID Pin | Length |
| ADP-240EB BH/BJ | 方型 | 方型 7.5*3.9 | | | 10.1 |

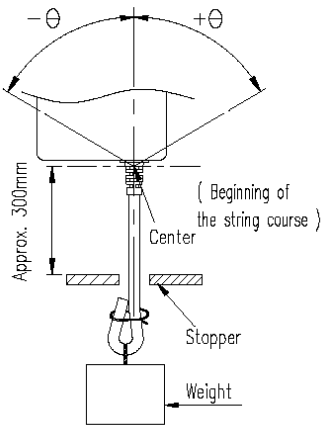
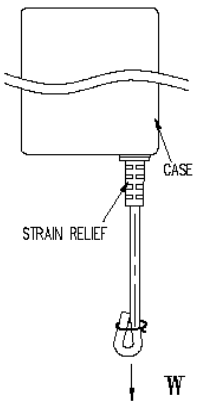
6.6 Adapter Weight:

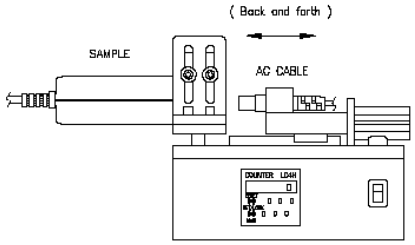
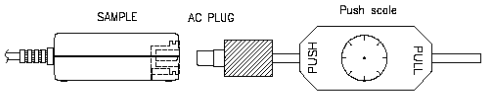
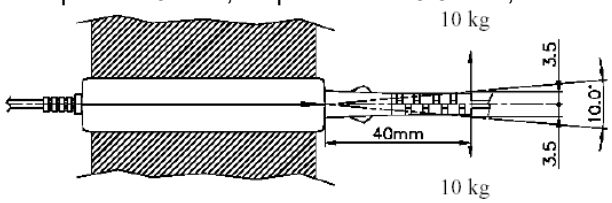
| Model Name | Weight |
|---|---|
| ADP-240EB BH | 580.0g±2.5% |
| ADP-240EB BJ | 525.0g±2.5% |

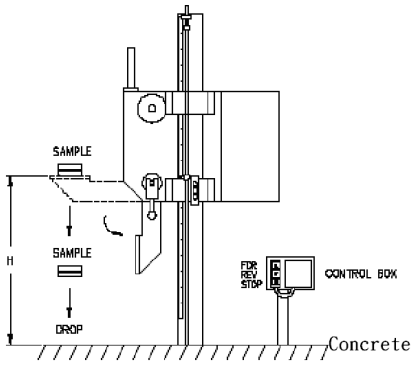
6.7 Plug & DC jack matching

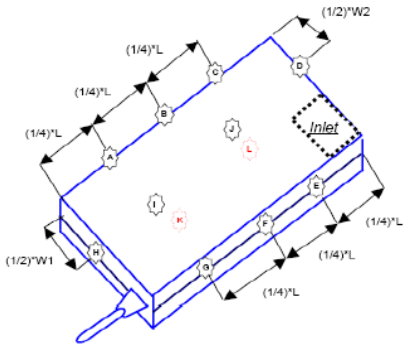
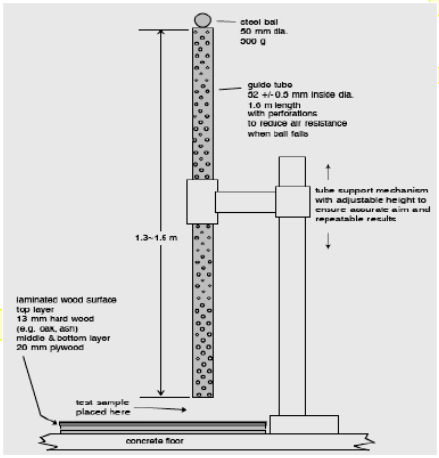
| Model Name | Plug P/N | DC jack P/N |
|---|---|---|
| ADP-240EB BH | ACES 56923-02022-101 | ACES 56921-01902-Z01 |
| ADP-240EB BJ | ACES 56923-02022-101 | ACES 56921-01902-Z01 |

## 7. Mechanical characteristics

| Item | | Conditions | Specification |
|---|---|---|---|
| 1. | Cord flexibility test | Hang the specified weight and swing it to one direction and return to the original position then swing to the opposite direction and return to the original position.This constitutes one cycle.The DC power supply shall be subjected to the specified cycles a specified speed.<br><br>Customer Spec:<br>1. Weight: 200g<br>2. Swing angle (θ): 90°<br>3. Cycles: 3000,10000cycles<br>4. Speed: 40 cycles/min.<br>5. Compliance:<br>plug SR, case SR<br>  | Disconnection rate of the wire shall be 30% or less for plug SR, core SR and 10% or less for case SR, without damage to the insulations, etc.. |
| 2. | Cord tensile test | A static load shall be applied and sustained for a period. Excessive load shall not be applied in this test, unless special request.<br><br>Load (w): 10 kgf<br>Durance: 60 sec<br>Angle: 90° /180°<br>  | The withdrawal of cord should be less than 2mm or without disconnection of cord |

| Item | | Conditions | Specification |
|---|---|---|---|
| 3 | AC plug in-out cycle test | AC plug in-out of AC inlet 6000 times, 30 times/min. without current flow.<br>  | 1. No found the AC inlet or pin damage.<br>2. ATS function Pass. Without distinct damage in appearance.<br>3. Refer to IEC 320 requirement. |
| 4 | AC socket insert-withdraw force test | After AC plug in–out cycle test , AC cable insert-withdraw to AC inlet 10 times<br>  | 1. Insert force must be keep 10N~50N.<br>2.Withdraw force must be lower 60N.<br>3. This test depends on IEC 320 requirement. |
| 5 | Wiggle test | AC cable inserted fully into AC inlet to wiggle 6000 times, 30 times per minute, then adjust the fixture to fit the wiggle angle in up and down each side 5 degree, ac cable up and down without current flow. (example: L=40 mm , amplitude = +- 3.5 mm , force = 10 kg )<br>  | 1. After this test, no found the AC inlet or pin damage.<br>2. Without distinct damage in appearance.<br>3. ATS function Pass. |
| 6. | Vibration | Non-operating, Random vibration:<br>5~100 Hz 0.015 G2/Hz<br>100~137 Hz 6 dB/oct<br>137~350 Hz 0.008 G2/Hz<br>350~500 Hz -6 dB/oct<br>Acceleration: 2.09 Grms<br>Duration: 20 min.<br>Direction: X,Y,Z | 1. PSU must operate with specification after non-operation test.<br>PSU shall be no mechanical damage after test. |

| Item | | Conditions | Specification |
|---|---|---|---|
| 7. | Shock | Non-operating<br>1. Pulse: Halfsine wave.<br>2. Peak acceleration: 50 G<br>3.Duration: 11ms<br>4. Number of shock: 1 shockper each direction, 6 directions. | 1. PSU must operate with specification after non-operation test.<br>2. PSU shall be no mechanical damage after test. |
| 8 | Drop test | 1. Operating<br>a. The drop height: H= 76 cm.<br>b. The drop orientation: 6 face for each.<br>c. Power on | 1. ATS function Pass.<br>2. No PWB copper pad peeling and broken.<br>3. No soldering crack.<br>4. No component broken..<br>5. Hi-pot test pass with specific condition.<br>6. Test Finger can't touch the Hazardous Voltage of the product. |
| | | 2. Non-operating<br>a. Drop height: H= 100 cm.<br>b. The drop orientation: 6 face for each. | |
| | | 3. Low height drop<br>Drop TIMES: 30 times for every surface (six side), 180 times in total.<br>Test surface material :The concrete<br>Drop height: 10cm | |
| | | 4. Equipment:<br>  <br> | |

| Item | | Conditions | Specification |
|---|---|---|---|
| 9. | Ball impact | 1.Steel ball: 0.54 kgf .<br>2.Drop height: 130cm.<br>3. A horizontal surface of laminated wood of hardwood at least 13mm thick, mounted on two layers of plywood each 19mm to 20mm thick, all supported on a concrete floor.<br>4. Impact location: Classify according to DUT's dimension. LxWxH<br><br>L+W <150 B,D,F,H,I,K<br>150<L+W <200 A,C,D,E,G,H,I,J,K,L<br>200<L+W A,B,C,D,E,F,G,H,I,J,K,L<br><br>  <br>5. Equipment:  | 1. Hi-pot test pass with specific condition.<br>2. Test Finger can't touch the Hazardous Voltage of the product. |

Product Application: NB

Product Ingress Protection(IP) rating: Not requirement(IP00).