REV.	Description	Date
00	SPEC ISSUE (NEW MODEL) ADP-330DB BA	04/15’21
01	102A-215164 1. Update item 1.1 Input Rated Voltage& Frequency base on Spec Label. 2. Add item 4.14 Define safety standard 3. Change Mechanical characteristics item 19 weight to 900+/-50g 102A-215191 ADD MODEL: ADP-330DB BA1	05/28’21
02	102A-217148 Remark item 1.8 ,1.9 ,4.11 ,4.13	07/21’21
03	102A-219037 ADD MODEL: ADP-330DB BA2	09/07’21
04	102A-21C258 UPDATE ITEM 4.5 EMI: conduction and radiation	01/04’22
05	102A-221088 ADD MODEL: ADP-330DB BA8	01/17’22

台達電子工業股份有限公司
DELTA ELECTRONICS, INC.

DESCRIPTION :
電氣規格(Electrical Specification)

MODEL NO. :
ADP-330DB B SERIES

Date	Drawn	Design (EE)	Design (ME)
01/17’22	王玉玲	高明宗	蔡柏崢

DOCUMENT NAME. :
ES-330DB B SERIES

REV.
05

FOR MODEL:

ADP-330DB BA	ADP-330DB BA1	ADP-330DB BA2	ADP-330DB BA8

Environmental Electrical Requirements

※PSID pin must be pull low in all test items, except OCP(L1) and PSID read.

ITEM	CONDITION	SPECIFICATION
1. AC Input Characteristics:		
1.1 Input Rated Voltage& Frequency	Base on Spec Label define	100V- 240V (F=50Hz-60Hz)
1.2 Input Voltage Range	Continuously	90Vac to 264Vac
1.3 Input Frequency Range	Continuously	47Hz to 63Hz
1.4 Input Voltage Harmonic Distortion		≤ 8%
1.5 Input Current	90Vac / full load 180Vac / full load	≤ 4.4A ≤ 2.2A
1.6 Inrush Current:		<22% I^2t of Fuse spec will not open and components will not be damaged.
1.7 Efficiency:	Average efficiency at loads of 25-50-75 and 100% load and 100% 90Vac	≥ 89%
1.8 Power Saving Requiement (The power saving test condition is cool efficient.)	115/230Vac 0.025W load 0.13W load 0.25W load 0.6W load 1.5W load 2.1 W load 3 W load 4 W load 10%load No load	Base on DELL Lab Reference Typ=180mw Max<=200mW Typ=300mw Max<=330mW ≥ 52% ≥ 70% ≥ 77% ≥ 79% ≥ 80% ≥ 81% ≥ 84% Typ=150mw Max<=180mW
1.9 Power Factor(PF)	115/230 Vac 60Hz 100%load 20%load	Base on DELL Lab Reference Typ= 0.94 Min>=0.92 ≥ 0.5 EN-61000-3-2(230Vac)
1.10 Auto Restart	90/264Vac; Min/Max Load; Under voltage deviation from nominal AC voltage: -40%, -50%, -60%, -70%, -80%, -90%, -100% Time intervals: 25ms, 40ms, 60ms, 90ms, 130ms, 200ms, 280ms, 400ms, 600ms, 900ms, 1.3S, and 2.0S	No latch

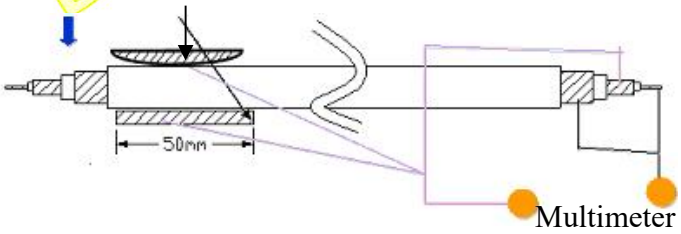
ITEM	CONDITION	SPECIFICATION
1.11 Brown out	Min/Max Load;	>35Vac
2. DC Output Characteristics:		
2.1 Output Rated Voltage	Measured at the end of DC cable	19.5V
2.2 Output Current	At constant voltage mode	0A to 16.92A
2.3 Output Voltage range	0A to 16.92A output at DC cable end	18.5~20.5V
2.4 Output Voltage Ripple and Noise: (0.1uF Ceramic Cap. And 100Uf Aluminum Cap. Paralleled between the end of output cable , BW=20MHz)	90V 0~16.92A 264V 0~16.92A	≤350mVp-p ≤350mVp-p
2.5 Output Overshoot Voltage:	From no load to 330W load, the output overshoot voltage	≤21V
2.6 Turn-On Delay Time:	Delay time from AC input to 10% Vo.	≤ 4s.
2.7 Rise Time:	DC output rise time from 10% to 90% of Vo	≥2ms & ≤ 100ms
2.8 Hold up time	50%Load, 100Vac Vo within regulation	≥8ms
2.9 Dynamic Load Change: (100Uf Aluminum Cap. Paralleled between the end of output cable)	Output change from 0A to 85% load, slew rate is 2.5A/us, Dynamic frequency is 50/100/1k/10kHz.	Voltage overshot Vos<1.5V Voltage undershot Vus<1.5V
2.10 Surge Load	16.92A~19.72A/4s Duty cycle 10%	Vo within >=18V
2.11 Transient Loading Condition	Capacitive 100Uf; Min/Max load Transient 1:30.25A/1ms(5%duty) Transient 2:27.5A/10ms(5%duty)	No latch Vo≥18V Vo≥18V
2.12 Loop gain		12Db/45 degree
3. Protection Characteristics:		
3.1 Short Circuit Protection:	The adapter will be latching when continuous short at DC output and no damage, it will enter into normal state by AC reset.	No damage
3.2 Over-Voltage Protection	The adapter will be latching that means no output while over voltage happened at output terminal that caused by internal fault, the output trip voltage will be between 21.2V~25V. That might be return to normal state by AC reset.	no damage
3.3 Over Current Protection:	The adapter will be latching when output over current, 10.8A~12.31A(PSID floating before AC-IN);22A~30A(PSID pull low) and delay time between 400ms~650Ms after the adapter has been plugged into the right system for 3s. That might be return to normal state by AC reset. (The test condition is ocp current add 0.5A to test ocp delay time.)	no damage

ITEM	CONDITION	SPECIFICATION
3.4 Over Temperature Protection:	The adapter will be latching. That will be return to normal state by AC reset.	no deformation and no discoloration on case
4. Environmental Characteristics:		
4.1 Electric Fast Transients:	Refer to IEC1000- 4-4 level 3	No function error No damage
4.2 Lightning Surge:	Refer to IEC1000-4-5 level 3 CM:2.5KV DM:1KV	No function error No damage
4.3 Electron Static Discharge: (Refer to IEC1000-4-2 Energy Storage Capacitor 150Pf ; Discharge Resistor 330Ω)	Air Discharge: ± 12Kv min. Air Discharge: ± 15Kv min Contact Discharge: ±6Kv min. Contact Discharge: ±8Kv min	No function error No damage No function error No damage
4.4 Cooling	Natural air cooling	
4.5 EMI: conduction and radiation	CISPR 22: CLASS B	EMI RFI 廠內若有頻段不足內規,可再經由確認 DELL lab 判定
4.6 Leakage Current	264Vac/50hz	≤ 70uA
4.7 Insulation Resistance:	Between AC input and secondary applied 500Vdc for 1 minute	≥ 100MΩ
4.8 Dielectric Strength: (Hi-Pot)	a. Primary to Secondary use 3000+10% Vac.(Rise time DC=1sec, AC=0.1sec).Test time=1sec. EVT1/DVT: arc sense 12mApeak test; PVT/MP: arc sense 16mApeak test. / 12mApeak test, Hi-Limit current=10Ma. Lo-Limit current=0.01Ma. b. Primary to Secondary use 4242 Vdc, test time 1sec. In production line.	
4.9 Temperature:	Operating Storage	0°C to 40°C -40°C to +70°C
4.10 Humidity:	Operating Storage	≤95% ≤95%
4.11 Common mode Noise	80KHZ – 400KHZ	Base on DELL Lab Reference Vac is 100V/240V with 0% and 100% load condition Typ=150mv Max<=220mV
4.12 Harmonic current	Refer IEC61000-3-2 Full load and Pin=75W	Need meet Class D limit.
4.13 Surface case Temperature	90Vac/60Hz	Base on DELL Lab Reference 5 face <=55 degree C
4.14 Define safety standard	Safety standard	IEC60950 and 62368-1

Mechanical characteristics

<table>
<tr><th colspan="2">Item</th><th>Conditions</th><th>Specification</th></tr>
<tr><td>1</td><td>Bending test</td><td>
<table>
<tr><th></th><th>Load</th><th>Angle (θ)</th><th>Arbitrary direction</th><th>Cycles in every minute</th><th>Sample size</th></tr>
<tr><td>Case - DC cord</td><td>227 g</td><td>0~180°</td><td>6250 Cycles</td><td>15 Cycles</td><td>24 Pcs</td></tr>
<tr><td>DC Cord-Plug</td><td>227 g</td><td>0~180°</td><td>6250 Cycles</td><td>15 Cycles</td><td>24 Pcs</td></tr>
</table>
Test Procedure:

a. Adjust the tester to count for 6250 cycles with a rate of 15 cycles per minute. Timing is listed below:
i. 0 – 180 degrees: 1.5 second, Dwell at 180 degrees: 1 second
ii. 180 – 0 degrees: 1.5 second, Dwell at 0 degrees: 0 second
b. Rotate each direction 180 degrees. One cycle is 180 degrees.
c. Connect the monitoring systems (monitoring event <=5sec) to record the voltage during test.
d. Connect the 19.5V voltage source through the Adapter for Power, PSID, and GRD.
e. PSU rated current to be applied to Power and GRD, with minimum of 1A applied to PSID. Deviation to be approved by Dell.
f. Voltage across all three lines (PSID, GRD, Power) must be continuously monitored continuously and test equipment must be programmed to stop when the voltage drops below 18.5V.
</td><td>Failure Criteria:

a. Any voltage that falls below 18.5V. Must be repeatable.
b. Any structural cracks, breaks, or tearing in the cable. No Exposed Metal.
c. Minor cosmetic damage is acceptable</td></tr>
<tr><td>2.</td><td>Compression Test</td><td>For coaxial design, the positive of multimeter is connected to center conductor and the outer spiral conductor, and the negative is connected to inner spiral conductor and fixtures. For flat cable, each wire V+, GND, and PSID must be checked independently for shorting with each other under pressure. The material of the fixtures is stainless and it is a curved fixture, its thickness is 5 mm; length is 50 mm (See the figure). Compress speed is 1 ±.1 Kg/min. Sample size:12 Pcs
Fixture
 
</td><td>Failure Criteria

The cable should not short with pressure less than 100 Kg.</td></tr>
<tr><td>3.</td><td>Vibration</td><td>Only endurance conditioning by sweeping shall be made.</td><td>Output voltage :18.5V~20.5V</td></tr>
</table>

<table>
<tr><td></td><td></td><td>Operating
0.75 G zero to peak, 5 to 500 Hz, 0.5 octaves/minute, one cycle, 5 to 500 to 5 Hz per axis in each of three mutually perpendicular axes.

Non-Operating
1.5 G zero to peak, 5 to 500 Hz, 0.5 octaves/minute, one cycle, 5 to 500 to 5 Hz per axis in each of three mutually perpendicular axes.

0.025 G squared/Hz, 10 to 500 Hz, nominal 3.5 G RMS level, one hour per axis, in each of three mutually perpendicular axes for a total duration of three hours.</td><td>Dielectric strength：Without ignition smoke, damage, arcing or breakdown.

Insulation resistance ：30MΩ or more

Appearance：There shall be no blistering of the specification label or other damage to the construction.</td></tr>
<tr><td>3-1</td><td>Random Vibration (Non-Operational)</td><td>The random spectrum will be 3.08Grms.
Perform random vibration testing on three (3) mutually orthogonal axes.
Each vibration test will run for 30 minutes.

Random Vibration Breakpoints:
<table><tr><th colspan="2">PSD Break Points for 3.08Grms</th></tr><tr><th>Frequency (Hz)</th><th>Acceleration (G^2/Hz)</th></tr><tr><td>7</td><td>0.004</td></tr><tr><td>20</td><td>0.013</td></tr><tr><td>33</td><td>0.003</td></tr><tr><td>156</td><td>0.1</td></tr><tr><td>200</td><td>0.026</td></tr><tr><td>233</td><td>0.04</td></tr><tr><td>282</td><td>0.0037</td></tr><tr><td>312</td><td>0.01</td></tr><tr><td>400</td><td>0.0002</td></tr><tr><td>500</td><td>0.0002</td></tr><tr><td>600</td><td>0.00009</td></tr><tr><td>700</td><td>0.000023</td></tr><tr><td>800</td><td>0.00003</td></tr></table></td><td>The voltage delta between pretest and posttest voltages shall not exceed 5%.

The function must be ok and no any solder crack be found.

All parts and glue must be no damage and movement.</td></tr>
<tr><td>3-2</td><td>Random Vibration (Operational)</td><td>The random spectrum will be 2.17Grms.
Perform random vibration testing on three (3) mutually orthogonal axes.
Each vibration test will run for 30 minutes.
A meter will be reading the voltage throughout testing.
The voltage will remain within the 5% allowance during testing.

Random Vibration Breakpoints:</td><td>The voltage delta between pretest and posttest voltages shall not exceed 5%.

The function must be ok and no any solder crack be found.</td></tr>
</table>

<table>
<tr><td></td><td></td><td>
<table>
<tr><th colspan="2">PSD Break Points for 2.17Grms</th></tr>
<tr><th>Frequency (Hz)</th><th>Acceleration (G^2/Hz)</th></tr>
<tr><td>7</td><td>0.001</td></tr>
<tr><td>21</td><td>0.007</td></tr>
<tr><td>32</td><td>0.0027</td></tr>
<tr><td>53</td><td>0.03</td></tr>
<tr><td>80</td><td>0.005</td></tr>
<tr><td>155</td><td>0.04</td></tr>
<tr><td>190</td><td>0.01</td></tr>
<tr><td>204</td><td>0.017</td></tr>
<tr><td>234</td><td>0.006</td></tr>
<tr><td>260</td><td>0.013</td></tr>
<tr><td>600</td><td>0.0005</td></tr>
<tr><td>700</td><td>0.0005</td></tr>
<tr><td>800</td><td>0.00015</td></tr>
</table>
</td><td></td><td>All parts and glue must be no damage and movement.</td></tr>
<tr><td>4.</td><td>shock</td><td>Operating
10 G, 11 ms, half sine, one shock input in each of three mutually perpendicular axes, for a total of six shock inputs.

Non-Operating
100 G peak, trapezoid, 180 in/s velocity change, one shock input per direction in each of three mutually perpendicular axes, for a total of six shock inputs.
240 G peak, 2 ms, half sine, one shock input in each of three mutually perpendicular axes, for a total of six shock inputs.</td><td>Output voltage :18.5V~20.5V

Dielectric strength：Without ignition smoke, damage, arcing or breakdown.

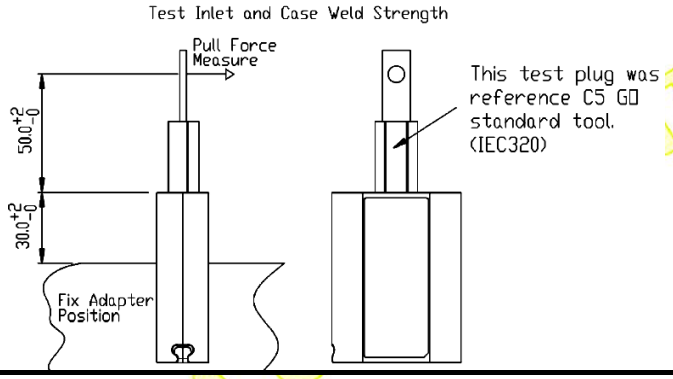
Insulation resistance：30MΩ or more.

Appearance：There shall be no blistering of the specification label or other damage to the construction.</td></tr>
</table>

5.	Drop test I	Delta Drop Test Standard for Portable Power Supply Test height：1 meter for every surface(six sides) 1 times Test surface material：hardwood surface or concrete	1. Electrical characteristic shall be satisfied. 2. PWB 銅箔無掀起或傷害 3. 無銲錫破損 4. 無零件破損 5. 若測試造成外殼(Enclosure)裂縫,必須Repeat test 5 times. 並進行 root cause analysis and provide corrective action. 6. 測試 Hi-pot 為"PASS"時,產品若有破洞, 裂縫時需檢查 User accessible area 與 Hazardous voltage parts,必須 keep Double or Reinforced insulation.
6	Drop test II	Drop TIMES: 50 times for every surface (six side),total 300 times Test surface material : The concrete Drop height: 10cm	1. Electrical characteristic shall be satisfied. 2. PWB 銅箔無掀起或傷害 3. 無銲錫破損 4. 無零件破損 5. 若測試造成外殼(Enclosure)裂縫,必須Repeat test 5 times. 並進行 root cause analysis and provide corrective action. 6. 測試 Hi-pot 為"PASS"時,產品若有破洞, 裂縫時需檢查 User accessible area 與 Hazardous voltage parts,必須 keep Double or Reinforced insulation.

7	AC inlet insertion and withdrawal	DENAN-LAW：Rated load 5000 times, and rated load 1.5 folds/100 times (20 times/min.) UL/CSA：Rated load 1.5 folds/250 times (10 times/min) IEC：Rated load 1000 times, and without rated load 3000 times (15 times/min.)	Without distinct damage in appearance. Electrical characteristic shall be satisfied.
8.	AC inlet weight test	The plug shall be connected to AC inlet then direction of plug X and Y shall be applied to there condition. Weight: 100 N. Time: 5 sec. Test times: 3 times.	Without distinct damage in appearance. Electrical characteristic shall be satisfied without solder crack of mounted board on AC inlet
9	Ball impact	Delta Impact Test Standard for Portable Power Supply 1 The sample is placed on the laminated wood surface with the surface to be impacted positioned horizontally. If the sample needs to be stabilized or held in place, the stabilizing device must be solid to allow for the intended force to be delivered to the sample. For example, if blocks are used to support the samples, the blocks shall be secured together so that the sample sits securely and doesn't move due to the impact delivered by the steel ball. The sample must be in contact with the laminated wood surface at all times. 2 The steel ball is allowed to fall freely from rest through the guide tube for a vertical distance of 1.3M to the point of impact. 3 Only one impact per sample shall be made. Use new samples for additional impacts.	1. 若測試造成外殼(Enclosure) 裂縫,必須 Repeat test 5 times. 並進行 root cause analysis and provide corrective action. 2. 測試 Hi-pot 為"PASS"時,產品若有破洞, 裂縫時需檢查 User accessible area 與 Hazardous voltage parts, 必須 keep Double or Reinforced insulation.
10	Acoustic Noise	Measurements to determine the AC adapter sound pressure are made using a 1/2" low noise free-field microphone in a inner size with 45(W)×45(D)×65(H) cm^3 Anechoic chamber.	Delta Spec.: The AC Adapter shall produce no human perceivable audible noise (less then 25dB) No load：< 22dB 0~Full Load:： 25dB
		Measurements to determine the AC Adapter sound quality are made using a binaural (artificial) head in a qualified chamber that meets the requirements of ISO 3744, Clause 4.3.	Dell Spec.: Please kindly refer to DELL AC Adapter Sound Quality Test Procedure (Number: AC0103) "AC Adapters Sound Quality Test Procedure

11	Adhesion of specification labels	1. Tape peeling test 2. High temperature storage The AC adaptor shall be stored at a temperature of 65 ± 2℃ with relative humidity of 90% to 95% for 6 to 7 h 3. Low temperature storage The d. c. power supply shall be stored at a temperature of -20 ± 3℃ for 6 to 7 h.	There shall be no blistering or peeling of the specification label.
12	Wiggle test	1. Fasten adapter and cord firmly to their plates. 2. Adjust motor cam shaft so that AC adapter is in max forward position. 3. Connect cord to AC power and adapter output cable to DC load with LED to indicate that power is on. 4. Adjust plate distance so that adapter and cord just make connection and LED is lit. 5. Adjust DC load to maximum load for adapter (65W adapter = 3.75A). 6. Let adapter thermally soak for 15-20 minutes. 7. Adjust Variac to ~30VAC (~750RPM) and run for ~10 minutes. 8. Adjust Variac to ~0VAC and adjust motor cam shaft so that AC adapter is in max forward position. 9. Adjust plate distance so that adapter and cord just make connection and LED is lit. 10. Repeat steps 7 through 9 until adapter receptacle contacts begin to produce audible arcing noises. 11. Repeat steps 6 through 9 except lower Variac operational voltage to ~20VAC (~300RPM) until adapter begins to produce consistently Long or loud popping and arcing noises. 12. Remove adapter and plug from plates and attempt to manually twist cord slightly while varying the insertion distance, attempting to produce prolonged arcing, If manual manipulation should begin to prove unproductive, return to fixture and repeat step 11. 13. There is a "test to failure" pass criteria. This means continue to execute this test procedure until the adapter no longer conducts or the test ends in smoke or melting.	1. 如過程中有發煙,熔毀,停止後將樣品外殼拆開,觀察 SOCKET 後方如果 Pin 鉚接處沒有晃動, 可判定為 "PASS", 如 SOCKET 後方零件有被燒毀的現象,則判定為 " FAIL" 2. 請注意卯接處發黑不是指塑膠熔毀後,覆蓋於卯接處的現象

13	Tumble Test 測項 (10000-0157-0011)	1.Drop height: 50cm 2.Tumble cycles: 5 cycles 3.Check function after 5 cycles	判定標準 1.若測試造成外殼(Enclosure)裂縫,以不允許金手指插入作為判定標準 2.測試 Hi-pot 為"PASS"時,產品若有破洞, 裂縫時需檢查 User accessible area 與 Hazardous voltage parts,必須 keep Double or Reinforced insulation.
14	AC inlet Bending Force test	1. Adapter is fixed by fixture and body of adapter extends 30mm from fixture. 2. The test inlet was reference C5 GO standard tool. 3. The distance between load point and inlet surface is 50mm. 4. We issue this test for both logo and label side. 5. Minimum bending force is 15 Kgf 	We stop pull force immediately when we hear break voice. We test each side once time for 5 pcs sample to take data.
15	Outline Dimension Case Color	184.0 x 86.0 x 25.4 mm Color: Black	L x W x H Color
16	AC Inlet	C14 Type	C6 or C8 or C14 or CX Type
17	DC Connector	Dell Barrel plug Type 7.4 x 5.1 x 12.5mm	X Type O.D. x I.D. x L
18	DC Cable Length	1800 mm	XXXX mm
19	Weight	900+/-50g	XXg

Product Application: NB

Product Ingress protection (IP) rating: Not requirement