

REV.	Description	Date
S00	SPEC ISSUE (NEW MODEL)	02/21'24
S01	102A-243197 Change item3.4 “UL20276 18AWG*2+24AWG*1” to “UL20276 20AWG*2+24AWG*1”	03/22'24
S02	102A-244034 Item 1.2.14.5 PPS and AVS	04/09'24
S03	102A-245090 item 2.10.2 Electrolytic aluminum cap life time 刪除"in full load	05/15'24
S04	102A-247338 Change item3.7 Adapter Weight from 210g±2.5% to 204.3g±2.5%	07/30'24
S05	102A-248036 Change Mechanical characteristics item13 from “ External enclosures are subjected to a steady force 250N±10N for a period of 5 sec.” to “External enclosures are subjected to a steady force 12.2kg (120N) for a period of 60 sec.”	08/06'24
S06	102A-248120 Change 1.2.11 Load transient response For 9V mode output voltage shall within +-5% change to 10% 15V : 14.25~15.75 change to 13.5~16.5(15V)	08/12'24



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DESCRIPTION :
電氣規格(Electrical Specification)

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Date	Drawn	Design (EE)	Design (ME)	DOCUMENT NAME. :		REV.
08/12'24	邱美淳	胡育嘉	陳俊豪	ES-65ZW SERIES		S06

Frame Name:DF-PSLA4V-2R01.DOC

SHEET 2 OF 19

MODEL LIST

ADP-65ZW BNA			
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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

1.5A Max at **100Vac** input voltage.

1.1.6 Inrush Current Limit (cold start)

The I²t shall less then 22% of the Fuse.

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1.1.7 Efficiency (Warm Up)

1.1.7.1 Nominal input voltage, maximum load and measured at the end of DC cable.

(Warm up after 30min)

Vout	Efficiency
5	79.3%
9	84.5%
15	86.5%
20	87.0%

1.1.7.2 Active mode efficiency:

average efficiency of **25%,50%,75%** and **100%** load tested at **115Vac/60Hz** and **230Vac/50Hz**. (Warm up after 30min)

Vout	Efficiency
5	82.385%
9	87.62%
15	88.852%
20	89.00%

The efficiency at 10% loading shall be more than 76.835% (5V); 82.295%(9V) ; 83.853%(15V)
84%(20V) measure at 115Vac/60Hz and 230Vac/50Hz

1.1.8 No Load Power Consumption

5V only: Maximum non-load power consumption is less than **0.075W** at **115Vac/60Hz** and **230Vac/50Hz**

1.1.9 Power saving requirement

115Vac/60Hz , 230Vac/50Hz. (20V)

Output Voltage (V)	DC POWER(W)	AC Spec. Power (W)
20V	18.0	<21
	11.0	<14



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	5~6.5	Eff.>80%
	3	<5
	1.65	<3
	1.5	<2.2
	1	<1.6
	0.25	<0.47
5V	0.15	<0.28

1.2 Output Characteristics:

1.2.1 Rated Voltage

The rated output voltage is specified at **5V / 9V / 15 / 20V**.

1.2.2 Voltage Range

The output voltage range

Vout	Voltage Range
5	4.85~5.5V
9	8.55~9.45V
15	14.25~15.75V
20	19~21V

1.2.3 Current

This Adapter can work from **0 A to 3 A (5V~15V)** and **0 A to 3.25 A (20V)** output voltage is in section 1.2.2 specified range.

Vout	Load
5	0~3A
9	0~3A
15	0~3A
20	0~3.25A

1.2.4 Output Ripple and Noise



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Output ripple voltage is **180mV / 200mV / 300mV / 300mV** peak to peak.

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.

T4. 47Hz and 63Hz tested at 90Vac and 264Vac. @ 25°C

Vout	Ripple and Noise
5	180mV
9	200mV
15	300mV
20	300mV

1.2.5 Turn On delay time

The Adapter shall switch on in less than **3 seconds** (5V only) at input voltage is 100Vac~240Vac.

1.2.6 Hold –up time

The output voltage shall be sustained **5mS** (20V only) 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 **40mS** (5V only) at nominal line and maximum load.

1.2.8 Overshoot

The output overshoot at turn on shall not exceed **10%** of normal voltage value with or without the load connected.

1.2.9 Peak load (20V/15V only)

The adapter shall support below loading condition without and damage, safety issues and protection happen. The



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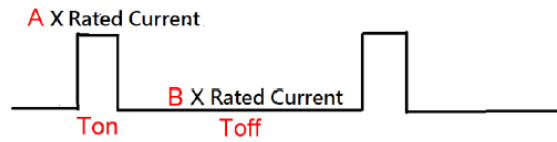
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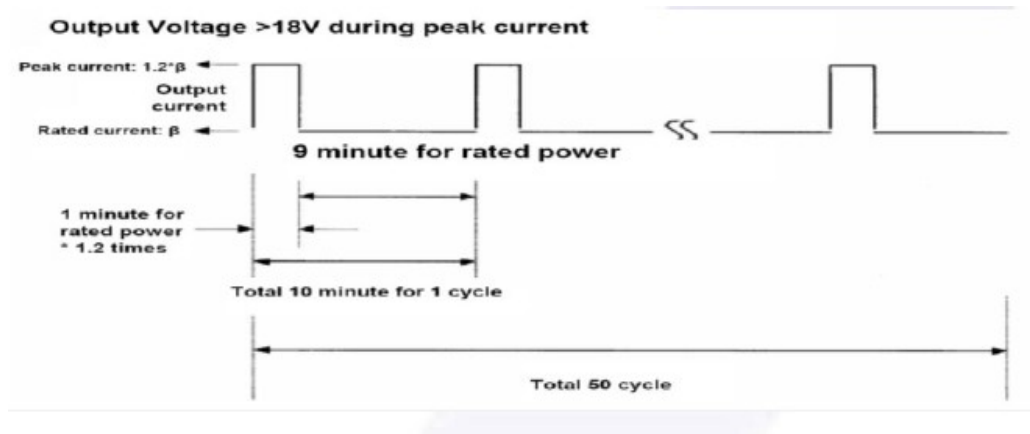
output voltage shall more than **18.3V (20V mode) / 13.5V (15V mode)** at input voltage is **100-240Vac/50Hz-60Hz** in 25°C.



Spec	Ton	Toff	A	B
1	2ms	18ms	200%	90%
2	250us	2.25ms	225%	87.5%

1.2.10 Surge load (20V/15V only)

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 /13.7V** at input voltage is 100-240Vac in 25°C.



1.2.11 Load transient response

(1) For 5V Output and 9V output must to meet condition 1 and condition 2



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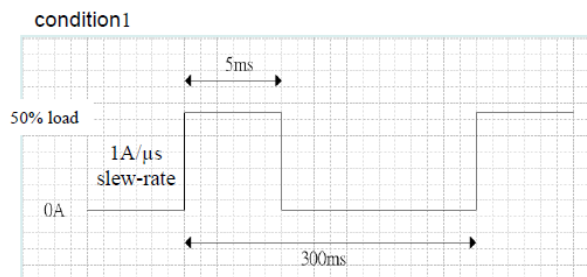
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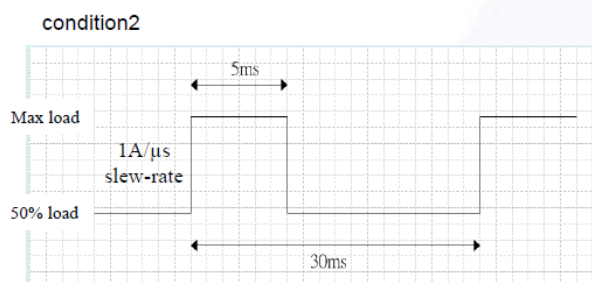
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For 5V mode
Output voltage range:
-Max . 5.8V
-Min. 4.6V

For 9V mode
Output voltage shall within +/-10%



(2) The adapter must within regulation when applied a step load from 0.05A to 100% load at

2.5A/us slew rate , 50% Duty cycle , Frequency be operated 100Hz/100KHz in 25°C.

The output voltage will be performed **13.5~16.5(15V); 19 ~ 21V(20V)**

1.2.12 Hot Plugging

Plugging a live AC adapter into the system with 100uF (for 5V Mode) and 1000uF (for 15V/20V Mode) capacitance shall not trigger any protections or cause the adapter to shut down

1.2.13 Voltage Dips (for 20V Mode)

-Follow the test item “ >95% reduction , 0.5 period ” in IEC 61000-4-11 Standard. -The output voltage shall be more than 14.5V at the below condition :

(a) AC Input = 100Vac/50Hz



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(b) Load = 33W~ 45W constant power (instead of constant current)

-Follow the test item “30% reduction, 25 periods” in IEC 61000-4-11 Standard. -Criteria: A

(a) AC Input = 100Vac/50Hz

(b) Load = 33W~ 45W constant power (instead of constant current)

1.2.14 Protection

1.2.14.1 Over Voltage Protection

The output shall be protected to **AC latch-off** at over-voltage condition. That might be return to normal state by AC reset.

Vout	OVP
5	7.5V
9	13.5V
15	20.25V
20	27V

1.2.14.2 Over Current Protection

The adaptor shall be **DC latch-off** with 60ms deglitch time. (It will enter into normal condition by re-plug in DC plug)

Vout	OCP
5	3.3~3.6A
9	3.3~3.6A
15	3.9A~5A max
20	3.9A~5A max

1.2.14.3 Short Circuit protection

Output can be shorted without damage. The adaptor shall be **DC latch-off**. (It will enter into normal condition by re-plug in DC plug)



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1.2.14.4 Over Temperature Protection

No deformation and no discoloration on case and will be shut down (**AC or DC latch-off**). That will be return to normal state by re-plug in DC plug

1.2.14.5 PPS and AVS function

Item	Vout	Load
PPS	5V~21V	3A
AVS	9V~14.9V	3A
	15V~20V	3.25A

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**.

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 **5% to 90%** relative humidity, non-condensing.



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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 +-1.5KV/1.2 * 50uS 5 times No function error.

L-FG, N-FG +-2.5KV/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 performance criterion B.

±12KV air discharge performance criterion A.

±8KV contact discharge performance criterion A.

2.5 Surface Temperature rise

Ambient **40°C**; input voltage 100Vac/240Vac case temperature rise $\leq 40^{\circ}\text{C}$ with system loading (95%) on bakelite.

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 10mA.

2.7 Leakage Current

Y cap no more than 220pF.



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Leakage current no more than 20uA(max) at 240Vac/50Hz.for delta product line.

2.8 Insulation Resistance

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 Part 15.

(b) CISPR 22 Class B.

(c) The limits shall be meet with a margin more than 4dB with all system applicable.

2.10 MTBF

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

The calculated MTBF shall be **150,000** hours of continuous operation at **25°C**,
maximum load and 100Vac / 240Vac.

2.10.2 Electrolytic aluminum cap. Lifetime

The lifetime is least 26280 hours at 25°C at 100Vac/60Hz and 240Vac/50Hz,DC output load : 95%.

2.11 Safety request

Meet IEC 60950-1

Meet IEC 62368-1


Meet LPS

Meet DOE Level6

Meet COC Tire2

2.12 Acoustic test

Input Condition

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Vin: 90Vac~264Vac Frequency : 47Hz to 63 Hz

Load Condition:

(a)Dynamic Load follower ASUS Spec

(b)Static Load

-for 5V : 0.02A/step (No load to 2W), and 0.1A/step (2W to Full load)

- for 9V/15V : 0.01A/step (No load to 2W), and 0.1A/step (2W to Full load)

- for 20V : 0.005A/step (No load to 2W), and 0.1A/step (2W to Full load)

NB ADAPTER SPEC :

Static Load

WM Type : Microphone at a distance of 10cm from the surface and noise level is less than 20dB

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

Dynamic Load

WM Type : Microphone at a distance of 10cm from the surface and noise level is less than 25dB

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

3. Mechanical

3.1 Outline Dimension: 63.0 * 63.0 * 28.5 mm, color: Black

3.2 Plug Type


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ADP-65ZW BNA	US

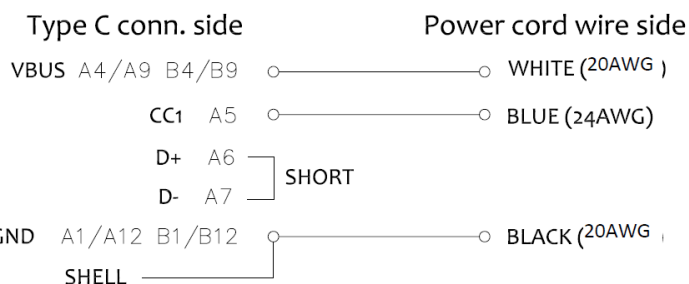
3.3 DC Cable Length: 2000 mm

3.4 DC Cable Type: UL20276 20AWG*2+24AWG*1

3.5 DC Connector Dimension: USB TYPE C

3.6 Pin assignment of Type C connector:


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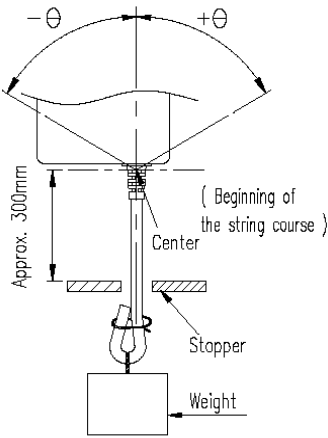
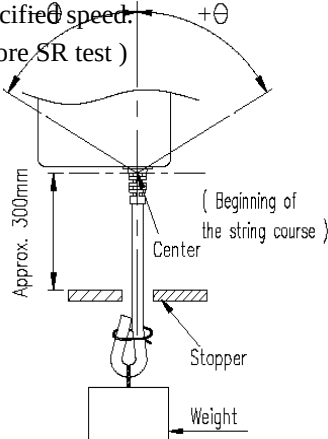



3.7 Adapter Weight:

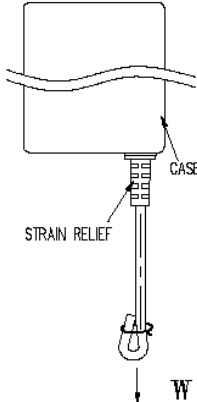

MODEL LIST	Weight
ADP-65ZW BNA	204.3g \pm 2.5%

Mechanical characteristics

Item	Conditions	Specification
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1.	Cord flexibility test(Delta spec)	<p>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.</p> <ol style="list-style-type: none"> Weight: 200g Swing angle (θ): 0 ~ 180° Cycles: 1000,3000,10000cycles Speed: 40 cycles/min. Compliance: case SR, Plug SR 	<p>Disconnection rate of the wire shall be</p> <p>1000 cycles –less 10% for Plug SR</p> <p>3000 cycles – less 20% for case SR</p> <p>3000 cycles – less 30% 10000 cycles – less 100% without damage to the insulations, etc..</p>
2.	Cord flexibility test (Customer Spec.)	<p>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. (If the cable is without core don't need core SR test)</p> <ol style="list-style-type: none"> Weight: 200g Swing angle (θ): +/- 90° Cycles: 3000, 10000 cycles Speed: 40 cycles/min. Compliance: plug SR, case SR. 	<p>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..</p>

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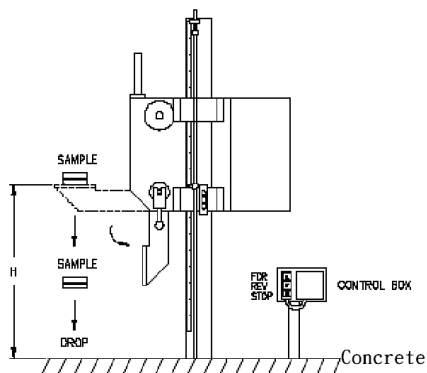
3.	Cord tensile test	<p>A static load shall be applied and sustained for a period. Excessive load shall not be applied in this test, unless special request.</p> <p>Load (w): 10 kgf</p> <p>Durance: 60 sec</p> <div></div>	Contact part and bushing shall not be detached.		
4.	Vibration	<p>Non-operating, Random vibration:</p> <p>5~100 Hz 0.015 G2/Hz</p> <p>100~137 Hz 6 dB/oct</p> <p>137~350 Hz 0.008 G2/Hz</p> <p>350~500 Hz -6 dB/oct</p> <p>Acceleration: 2.09 Grms</p> <p>Duration: 20 min.</p> <p>Direction: X,Y,Z</p>	<p>1. PSU must operate with specification after non-operation test.</p> <p>2. PSU shall be no mechanical damage after test.</p>		
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5.	Shock	Non-operating 1. Pulse: Half sine wave. 2. Peak acceleration: 50 G 3. Duration: 11 ms 4. Number of shock: 1 shock per each direction, 6 directions.	1. PSU must operate with specification after non-operation test. 2. PSU shall be no mechanical damage after test.
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	Item	Conditions	Specification
6.	Drop test (with outline label)	1. Operating a. The drop height: H= 76 cm. b. The drop orientation: 6 face for each. c. Power on 2. Non-operating a. Drop height: H= 110 cm. b. The drop orientation: 6 face for each. 3. Low height drop Drop TIMES: 130 times for every surface (six side), 780 times in total. Test surface material : The concrete Drop height: 10cm	1. ATS function Pass. 2. No PWB copper pad peeling and broken. 3. No soldering crack. 4. No component broken.. 5. Hi-pot test pass with specific condition. 6. Test Finger can't touch the Hazardous Voltage of the product.

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4. Equipment:



Item	Conditions	Specification
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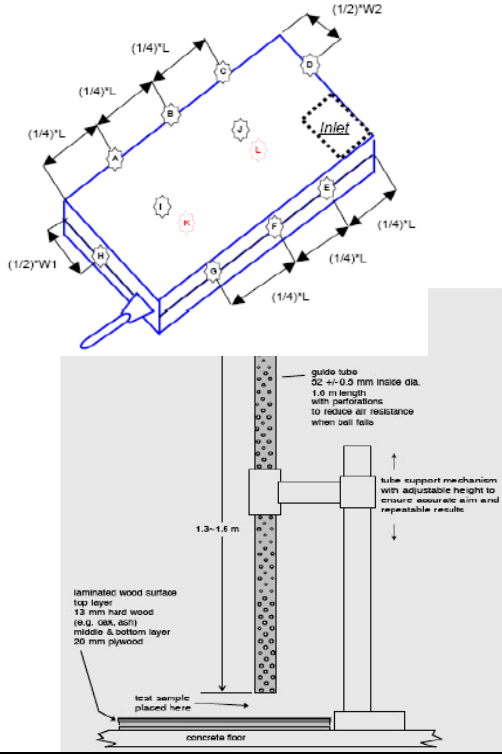
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7.	<p>Ball impact (with outline label)</p>	<ol style="list-style-type: none"> 1. Steel ball: 0.54 kgf . 2. Drop height: 30 cm. 3. A horizontal surface of laminated wood of hardwood at least 13mm thick, mounted on two layers of plywood each 19mm to 20mm thick, all supported on a concrete floor. 4. Impact location: Classify according to DUT's dimension. LxWxH <p> $L+W < 150$ B,D,F,H,I,K $150 < L+W < 200$ A,C,D,E,G,H,I,J,K,L $200 < L+W$ A,B,C,D,E,F,G,H,I,J,K,L </p>  5. Equipment: 	<ol style="list-style-type: none"> 1. Hi-pot test pass with specific condition. 2. Test Finger can't touch the Hazardous Voltage of the product.
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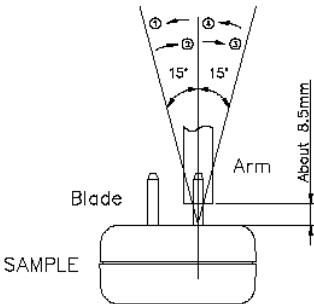



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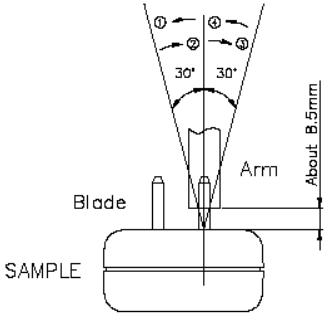
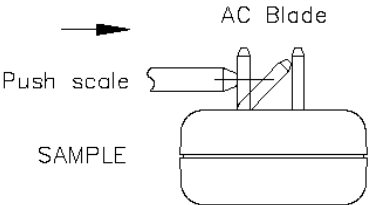
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8.	AC Inlet Bending(I)	<p>1. Bending angle 15 °for either side.</p> <p>2. Bending speed 10 times per minute.</p> <p>3. Must withstand 30 times totally.</p> <p>Equipment:</p> <p>Arm controller: Delta.</p> 	<p>1. The blade can't be any crack or damage.</p> <p>2. This test refers to JIS C8303 requirement.</p>
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9	AC Inlet Bending(II)	<p>1. Bending angle 30 °for either side. 2. Bending speed 10 times per minute. 3. Must withstand 5 times totally.</p> <p>Equipment: Arm controller: Delta.</p> 	<p>1. The blade can't be any crack or damage. 2. This test refers to JIS C8303 requirement.</p>
10	Push Force	<p>Push one side blade to touch another side. The force must over 4.08kgf.</p> <p>Equipment: Push-Pull force measurement controller (50kgf)</p> 	<p>No electrical or mechanical problem happened and no abnormality found in the shape.</p>



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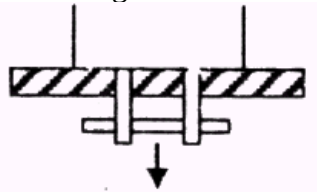
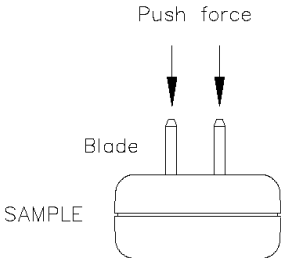
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11	Load Weight	<p>A static load 351b (15.9kg) / 2min for both pin to downside.</p> <p>Equipment: Load weight controller: Delta.</p> 	No electrical or mechanical problem happened and no abnormality found in the shape.
12	Push Blade	<p>Push both pin to inside that must withstand 20kgf / 1 min.</p> <p>Equipment: Push-pull force measurement controller (50kgf)</p> 	No electrical or mechanical problem happened and no abnormality found in the shape



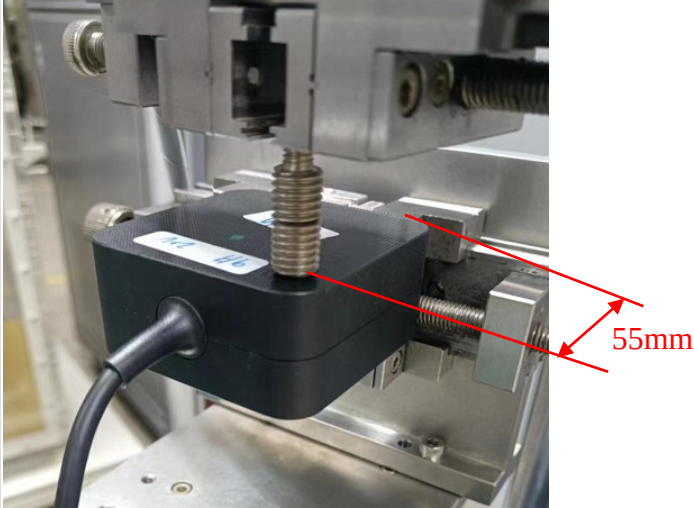
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13	Side Thrust	<p>External enclosures are subjected to a steady force 12.2kg (120N) for a period of 60 sec.</p> <p>Sample: 2pcs</p> <p>Test point: feature of product end.</p>  <p>Equipment: 拉伸試驗儀</p>	At worst case condition, there are no damage on plastic case and socket and MUST keep the minimum safety distance 5.0mm
14	Packing Test	<p>Drop Test: Drop height is 350mm, testing method refers to 10000-0089</p> <p>Vibration Test: Testing method refers to 10000-0089</p>	After test, the product should be no abnormal function and broken appearances.

Product Applications: Notebook

Product Ingress protection(IP) rating: Not requirement



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