REV.	Description	Date
00	SPEC ISSUE (NEW MODEL) ADP-65VE BA	12/09’21
01	102A-221177 1. Item 1 Profile table update. 2. Item 2.1.1 Input Rated voltage 115/230Vac change to 100/240Vac 3. Item 3.1.1 Update maximum temperature rise to 50 ◦ C 4. Item 2.2.4 OUTPUT OVER/UNDER SHOOT Specification update.	01/28’22
02	102A-222095 1. CHANGE ITEM 3.5.4 SHIPPING 42-inch drop, all edges, surfaces TO 30-inch drop, all edges, surfaces --> FOLLOW HP SPEC TO CORRECTION SPEC. FOR 9. MECHANICAL 2. ADD ITEM 18 PACKAGE TEST (1.) DROP TEST, 30-INCH DROP, ALL EDGES, SURFACES — WHILE ENCLOSED IN APPROPRIATE SHIPPING CONTAINER. (2.) DROP TEST, TEST CONDITION SEE 10000-0089 (3.) VIBRATION TEST, TEST CONDITION SEE 10000-0089	02/21’22
03	102A-222167 1. Item 2.3.3 OVP 5V standard revise to <8V.	03/04’22
04	102A-225003 Section2 item 2.7 "surge load" Remove 5V peak load required.	05/06’22
05	102A-226075 1. ITEM 9. Add 5-1 Tumble test Conditions a. Drop height: 50 cm b. Tumble cycles: 30 Cycles(60 times) c. Other detail test condition and Criteria refer to 10000-0258	06/17’22
06	102A-227208 1. ITEM 9. MECHANICAL DELELE 18 (1.)DROP TEST, 30-INCH DROP, ALL EDGES, SURFACES — WHILE ENCLOSED IN APPROPRIATE SHIPPING CONTAINER	08/04’22
07	102A-228032 1. ITEM 9. MECHANICAL ADD ITEM 18 (1.)DROP TEST, 30-INCH DROP, ALL EDGES, SURFACES — WHILE ENCLOSED IN APPROPRIATE SHIPPING CONTAINER	08/05’22

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-65VE B SERIES

Date	Drawn	Design (EE)	Design (ME)	DOCUMENT NAME. :	REV.
03/20’24	王玉玲	陳新淵	陳威堯	**ES-65VE B SERIES**	10

REV.	Description	Date
08	102A-229194 ADD MODEL: ADP-65VE BA9 102A-229212 ADD MODEL: ADP-65VE BA77	10/03’22
09	102A-22C156 ADD MODEL: ADP-65VE BB	12/30’22
10	102A-242111 ADD MODEL: ADP-65VE BC	02/26’24

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MODEL LIST: ADP-65VE BA/BA9/BA77/BB/BC

1. Profile

P1 / P2	0V(0)		5V(1)		9V(2)		12V(3)		15V(4)		20V(5)	
0V(0)	0 / 0		0 / 65		0 / 65		0 / 65		0 / 65		0 / 65	
			X	5V/3A	X	9V/3A	X	12V/5A	X	15V/4.33A	X	20V/3.25A
5V(1)	65 / 0		30 / 30		30 / 30		30 / 30		20 / 45		20 / 45	
	5V/3A	X	5V/3A	5V/3A	5V/3A	9V/3A	5V/3A	12V/2.5A	5V/3A	15V/3A	5V/3A	20V/2.25A
9V(2)	65 / 0		30 / 30		30 / 30		30 / 30		20 / 45		20 / 45	
	9V/3A	X	9V/3A	5V/3A	9V/3A	9V/3A	9V/3A	12V/2.5A	9V/2.22A	15V/3A	9V/2.22A	20V/2.25A
12V(3)	65 / 0		30 / 30		30 / 30		30 / 30		20 / 45		20 / 45	
	12V/5A	X	12V/2.5A	5V/3A	12V/2.5A	9V/3A	12V/2.5A	12V/2.5A	12V/1.66A	15V/3A	12V/1.66A	20V/2.25A
15V(4)	65 / 0		45 / 20		45 / 20		45 / 20		30 / 30		30 / 30	
	15V/4.33A	X	15V/3A	5V/3A	15V/3A	9V/2.22A	15V/3A	12V/1.66A	15V/2A	15V/2A	15V/2A	20V/1.5A
20V(5)	65 / 0		45 / 20		45 / 20		45 / 20		30 / 30		30 / 30	
	20V/3.25A	X	20V/2.25A	5V/3A	20V/2.25A	9V/2.22A	20V/2.25A	12V/1.66A	20V/1.5A	15V/2A	20V/1.5A	20V/1.5A

2. ELECTRICAL

A. INPUT CHARACTERIZATION

Item	Test	Condition	Specification
1.1	Input Rated Voltage		100~240Vac
	Input Voltage Range		90~265Vac
	Input Frequency Range		47~63Hz
	Input Current	90Vac 100%Load	1.6A
	Input Power	90Vac 100%Load	74W
	Power Factor	120Vac 100%Load	>0.5
	Efficiency	100Vac 100%Load	For reference

	Average Efficiency	115V/230Vac Single 65W(20V/15V) Single 60W(12V) Single 27W(9V) Single 15W(5V)	 89% 88% 86.7% 81.5%
		115/230Vac Multiple 63W~51W Multiple 45W Multiple 42W Multiple 33W Multiple 30W	 86% 84.7% 84.2% 82.4% 81.7%
1.2	POWER CONSUMPTION	115/230Vac, Output= No load 0.25W(20V) 0.5W(20V) 1W(20V) 1.5W(20V)	 <0.1W <0.5W <1W <1.7W <2.4W
1.3	INRUSH CURRENT	265Vac	1. Both Cold start(All component=0±3°C) and Hot start(40°C operate 15min) are need. 2. No damage. 3. Margin of the I2t rating of the input fuse/bridge rectifier.

1.4	BROWNOUT & BROWNOUT RECOVERY	100Vac; 80%Load	1. Brown out: Input down to 0Vac(slope=6.6V/min). 2. Recovery: Input up to 100Vac/50Hz(slope=6.6V/min). Output Shall recover before Input below 90Vac. 3. No damage. 4. Shall recover after an AC power reset. 5. CC singal should follow USB PD definition without any abnormal behavior when Vin>brown out point.
Item	Test	Condition	
B. OUTPUT CHARACTERIZATION			
2.1	LOAD, LINE/CROSS REGULATION	90~265Vac Vo=20V Vo=15V Vo=12V Vo=9V Vo=5v	Vo range= 19~21V 14.25~15.75V 11.4~12.6V 8.55~9.45V 4.75~5.25V
2.2	RIPPLE AND NOISE	90~265Vac 0~Full load.	Vpp<=380mV (Oscilloscope BW=20MHz.Need Add 1uF MLCC+10uF AL CAP.)

2.3	DYNAMIC LOAD RESPONSE	90~265Vac 0.1A~50%Load 50%~100%Load 0.1A~90%Load (Frequency=1Hz~5kHz Duty=50% Slew=1A/us Output parallel System CAP=1000uF/25V)	20V:18~22V 15V:13.5~16.5V 12V:10.8~13.2V 9V:8.1~9.9V 5V:4.5~6V
2.4	OUTPUT OVER/UNDER SHOOT	90~265Vac 0~Full load.	20V:<21V 15V:<15.75V 12V:<12.6V 9V:<9.45V 5V:<5.25V During power-on or power-off, the output voltage shall be monotonically increasing or decreasing with respect to the overshoot which shall neither each output volts peak nor be outside the regulation requirements for more than 10 ms
2.5	TIMING REQUIREMENTS(Power-on time)	90Vac 0~Full load.	<5s

	TIMING REQUIREMENTS(Rise time)	90~265Vac 0~2.5W 1. 0 to 5V 2. 5V to 20V 3. 5V to 15V 4. 5V to 12V 5. 5V to 9V	<275ms
	TIMING REQUIREMENTS(Hold Up)	115Vac 100%Load 1. 20V 2. 15V 3. 12V 4. 9V 5. 5V	>5ms
	TIMING REQUIREMENTS(Fall time)	90~265Vac 0~100%Load 1. 20V 2. 15V 3. 12V 4. 9V 5. 5V	<650ms

2.6	LOOP STABILITY	90~265Vac 0~100%Load 1. 20V 2. 15V 3. 12V 4. 9V 5. 5V	Phase margin>45deg Gain margin<-10dB Bandwidth>1kHz
2.7	SURGE LOAD (PEAK LOAD)	100~265Vac 200%Load/1ms+95%Load/19ms 175%Load/2ms+92%Load/18ms 150%Load/10ms+50%Load/10ms Output parallel System CAP=1000uF/25V)	20V:>18V 15V:>13.5V 12V:>10.8V 9V:>8.1V
2.8	BMC EYES DIAGRAM (USB-PD adapter)	Input=115Vac/60Hz,230Vac/50Hz	

C. PROTECTION

Item	Test	Condition	
3.1	SHORT CIRCUIT PROTECTION	90~265Vac 0~100%Load	Latch off, after SCP 3s.
3.2	OVER CURRENT PROTECTION	90~265Vac 0~100%Load	<8A

3.3	OVER VOLTAGE PROTECTION	90~265Vac 0~100%Load	20V:<29V 15V:<21.75V 12V:<15.8V 9V:<13.05V 5V:<8V Latch off

D. EMC/SAFETY/ENVIRONMENTAL

Item	Test	Condition	
4.1	HI-POT	Voltage=3000Vac Ramp time=500V/s Dwell Time=60s Test duration=1min	
4.2	LEAKAGE CURRENT (IEC60950-1,2nd Edition)	250Vac/50Hz	<40uA
4.3	ESD (IEC61000-4-2)	Contact 8kV Air 15kV 20kV	Criteria A Criteria A Criteria C
4.4	EFT (IEC61000-4-4)	Differential 2kV Common 2kV (Asynchronous/5kHz repetition)	Criteria A
4.5	AC SURGE IMMUNITY(PLD) (IEC61000-4-5)	Differential 1.5kV Common 2.5kV 3kV (0°/90°/180°/270°;10pulse/10sec)	Criteria A Criteria A Criteria C
4.6	EMI(CISPR32:Class B)	CONDUCTION RADIATION CISPR32:CLASS B	>4dB >4dB
4.7	CASE SURFACE TEMPERATURE RISE	100Vac 100%Load AMB=35°C	<50degC

4.8	HARMONIC CURRENTS	100/230Vac 100%Load	IEC61000-3-2:2014/JIS C 61000-3-2:2011 Class D.
4.9	ACOUSTIC NOISE	120/240Vac 0,10%,20%,50%,100%Load	1. Background<10dB, 100mm between MIC and Adapter. 2. Shall be conducted in accordance with ISO 7779(or ECMA-74) and dec,ared in accordance with ISO 9269(or ECMA-109).

3. ENVIRONMENTAL REQUIREMENTS

3.1 TEMPERATURE

3.1.1 Operating

The supply shall operate from 0 to 35°C. The maximum temperature rise of any surface shall not exceed 50°C when measured at 100Vac and at maximum load.

3.1.2 Non-Operating

The power supply can be stored from -20 to 85°C.

3.2 COOLING

The power supply shall be convection cooled only.

3.3 HUMIDITY

The power supply shall withstand without degradation with 95% relative humidity, non-condensing, both operating and non-operating.

3.4 ALTITUDE

3.4.1 Operating

The power supply can be operated at 5,000 m above sea level

3.4.2 Non-Operating

50,000 feet above sea level.

3.5 MECHANICAL SHOCK

(Power supply inside assembly.)

3.5.1 Operating

10 G, 11ms, half sine, one shock input in each of three mutually perpendicular axes, for a total of six shock inputs.

3.5.2 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.

3.5.3 UL Safety

36-inch drop onto hardwood surface, after which no safety hazard is encountered regardless of operational capabilities.

3.5.4 Shipping

30-inch drop, all edges, surfaces — while enclosed in appropriate shipping container.

3.6 VIBRATION

(Supply inside assembly.)

3.6.1 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.

3.6.2 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.

3.7 ELECTROSTATIC DISCHARGE (ESD)

The AC adapter shall withstand ESD test voltage conditions at any point on the enclosure using the test setups and conditions found in Document 131296 and with transients as defined in IEC 61000-4-2. As an infrequently user touchable subassembly, the following test levels shall be used. The Electrostatic discharge (ESD) shall meet the specification requirement.

a) Input Voltage : 110Vac/220Vac and Output Load : Maximum Load (Dummy Load)

b) After Air discharge ±15 kV and Contact discharge ±8 kV, adapter is no allowed error and damage.

c) After Air discharge ±20 kV, need report result.

The storage capacitance shall be 150 pF and the discharge resistance shall be 330 ohms.

3.8 Production Line Hi-pot Test

One hundred percent (100%) of the AC Adapter shall comply with the minimum Production Line Hi-pot (High Potential) Test as noted below. The test shall be applied between the PRIMARY (AC LINE and NEUTRAL) to SECONARY (Vo and GND).

PARAMETERS	SETTING
VOLTAGE	3000Vac Minimum
TRIP CURRENT SENSITIVITY	600 Microamperes Maximum
VOLTAGE RAMP TIME	500 V/Second ramp Minimum
DWELL TIME	1 Second Minimum
BREAKDOWN ARC DETECTION	10 Microseconds Maximum

NOTE:

The ROD-L DC Hi-pot Tester Model M100DC can be set to comply to the above test parameters.

3.9 ECO ENVIRONMENTAL

This section defines environmental requirements that are applicable to all products and product components. Individual components specifications may amend or append requirements to this base set as part of their component-specific requirements, but otherwise these requirements are applicable in all cases.

3.9.1 General Requirements

All products, components, and materials shall comply with the latest revision of HP Standard 011-00 General Specification for the Environment (GSE) including all referenced documents throughout the product life cycle.

Access to the public version of GSE is available from the URL.

http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04932490

3.9.2 Supplemental Environmental Specification

All commodity, component, and part materials shall comply with the HP Standard HX-00025-01 Supplemental Environmental Specification – Commodity and Component (Supplemental Environmental Spec) requirements. Component categories are created to allow different material

restriction requirements for each category. The Supplemental Environmental Spec is a supplement to the HP GSE.

The Supplemental Environmental Spec references the Substances and Materials Future Requirements (HX-00011-01A), Substances and Materials Business-Specified Requirements (HX-00011-01B), Substance and Materials Requirements, All Products (HX-00011-01) and Product Requirements, EEE Products (HX-00011-11) sections of the GSE with technical material and product specifications.

The product shall comply with all requirements in Supplemental Environmental Spec at the time of release, regardless of any future regulatory effective date.

The Supplier shall provide the required data to HP's System Integrator for the completion of the HP Environmental Data Sheet (EDS), HP Recyclability Assessment Tool (RAT), and Disassembly Instructions.

Individual commodity or component specifications may exempt requirements to the Supplemental Environmental Spec as part of component-specific requirements, but otherwisethe requirements in Supplemental Environmental Spec are applicable in all instances.

Low Halogen Exemption: Brominated and Chlorinated Flame Retardants; GSE section HX-00011-01B; GSE Id 090807-92, & 080715-34, & 090807-37 AND Antimony; GSE section HX-00011-01B; GSE Id 110727-47 & 110727-63 are not required.

Access to the HP Commodity/Component Spec (HX-00025-01), Substances and Materials Future Requirements (HX-00011-01A), Substances and Materials Business-Specified Requirements (HX-00011-01B), and Product Requirements (HX-00011-11) require access to the HP Supplier Handbook, Restricted Access. Register or sign in from the URL.

https://h20168.www2.hp.com/supplierextranet/index.do

3.9.3 Other ECO Requirements

Energy Requirements

3.10 Safety standards

UL62368-1

4. K OREA EPS-MEPS

- The External power supply must comply with the Korea Mandatory Energy Performance Specification (MEPS). The detailed requirements can be found in the HP GSE - Product Requirements.
- Please note since this requirement is now mandatory by the HP GSE, it will be deleted in future releases of the product specification.

5. AUSTRALIA AND NEW ZEALAND EPS REGISTRATION

- The External power supply must be registered in Australia and New Zealand. The detailed requirements can be found in the HP GSE - Product Requirements.

Accessibility

6. SECTION 508 ACCESSIBILITY – US

- The system must comply with the section 508 Accessibility – US requirements. Please reference: http://www.section508.gov/index.cfm?FuseAction=content&ID=12

EU Energy Related Products (formerly EuP)

EUP LOT 7

System must comply with EU regulation EU 1782/2019 for external power supplies. The detailed requirements will be found in the HP GSE - Product Requirements.

Belarus External Power Supply Certification

External power supplies must comply with energy efficiency standard STB 2463-2016. The detailed requirements can be found in the HP GSE – Product Requirements

Ukraine External Power Supply Certification

For products placed on market September 6th, 2020 and later: External power supplies must comply with Ukraine technical regulation No. 150. Detailed requirements will be found in the HP GSE – Product Requirements.

Deliverables:

- In country certification of each EPS – Ukraine national statement of conformity (NSoC)
- Ukraine Conformity Mark on external power supplies

NRCan (Canada) EPS certification and Registration

External power supplies must tested and registered according to Amendment 14, part 2 of the Canada energy efficiency regulation. The EPS must be certified by an accredited body and registered with the Canadian government by the supplier.

Deliverables:

- The external power supply must be marked with the roman numeral corresponding to the efficiency level met through the international efficiency protocol (VI or higher).
- A signed report and certificate issued by an ISO/EN 17025 accredited laboratory showing compliance with this requirement.
- Confirmation of registration with the applicable Canadian government agency.

Mexico NOM-029

External power supplies must comply with the Mexico NOM-029 energy efficiency specification. Products must be tested for OFF mode at 127V/60Hz and labeled with the

power consumption as required. The detailed requirements can be found in the HP GSE-Product Requirements.

Deliverables:

- In-country testing and certification of the EPS.

7. AGENCY APPROVALS

This product shall comply with all Regulatory requirements set forth in Hewlett Packard Specification 481605.

8. RELIABILITY

LIFE EXPECTANCY: The power supply shall have a field failure rate of less than 0.1% annually within the first three years of operation.

8.1 De-rating Guidelines

The following component de-rating requirements shall be followed:

- Semiconductor junction temperature shall be less than 130 ° C.
- Thermal De-rating at normal operation shall be <90%. Thermal measurements will be verified with the power supply mounted in a representative product enclosure. OTP shall not result in any damage and safety or reliability degradation. Need to meet HP
- Life time requirement is any load, Voltage and ambient temperature.
- Resistor power de-rating will be consistent with the resistor type and application
- Component voltage de-rating shall be < 95% for all continuous conditions.
- Components shall not exceed 100% of their voltage rating during start-up and transients; exception: Bulk Capacitors shall not exceed 110% during transients.
- Component current de-rating shall be <90% for all continuous conditions. Exception: Bulk Capacitors shall not exceed 100% for all continuous conditions. The effects of
- ripple current heating shall be accounted for in this de-rating.
- All components shall be de-rated to insure meeting the calculated MTBF
- All magnetic devices shall be rated for 130 ° C minimum
- All capacitors must be rated at 2000 hours or greater at maximum rated temperature, unless otherwise approved by HP. In any load, voltage and temperature, all capacitor must meet HP lifetime define

8.2 E-Caps life time

- All Aluminum electrolytic capacitors shall have a minimum lifetime of 8,736 hours at ambient temperature of 35degC and 80% load.
- Usage profile 8h x 52 weeks x 3 yrs = 8,736 hours

8.3 E-Caps Charge / discharge cycles

If the design presents operational modes where sustained regular repetitive heavy E-cap charge/ discharge cycles are used, the supplier has to ensure that the E-caps are suitable for such use and that these charge / discharge cycles are within the components specification limits.

8.4 Critical Components

The critical components list defines components with critical functionality, specifications, attributes, and parameters essential to the proper operation of the power supply and completed system. Once the list is complete for production, any deviation from this list requires documented completion of an agreed upon test plan. Final approval requires written HP acknowledgment. Due to the critical nature of these components, any deviation from the agreed upon BOM/AVL will jeopardize the stability, robustness and/or operation of the board. The timeframe for AVL proposals and finalization is described in the appropriate Statement of Work and schedule milestones. Specific application criteria for critical components are defined in Table 3.

TABLE 3

EPS CRITICAL COMPONENTS CRITERIA

Part Description	Application	Notes
Bridge Diodes	AC rectification	800V breakdown voltage minimum
Capacitors	Frequency and loop compensation	X7R dielectric or better
Capacitors	High voltage primary snubber circuits	Y5S or better
Capacitors	LLC resonant capacitor	PP (polypropylene) material or better
Capacitors(Plastic CAP)	PFC and LLC circuit	MPP or MPE is recommended. The PE type is restricted.
Bulk capacitor	Dc-bus	Active PFC, Boost, Fly-back topologies bulk cap rating shall be 450Vdc / 105degC minimum. Anode foil withstand voltage >= 640V Capacitance tolerance +20%/-10%
FET	DC to DC main switching, active PFC and stby circuit FET	FETs should be rated at least •600V Active PFC MosFET •600V PWM MosFET for Fly-back topologies •600V MosFET for LLC topologies
MOV (Metal Oxide Varistors)	EMI-filter, DC bus	If the usage of MOVs can't be avoided their voltage rating has to be greater 385Vrms
Magnetics	Main transformer and output coupled inductor	The turns ratio of the output coupled inductor must be matched to the main transformer windings
Magnetics	Inductors – powdered iron	Micrometals and Curie and Formosa Shing GA, TAF-200 are the only approved powdered iron cores
Adhesive	Component anchoring	Must be Electronics Grade and meet UL94V-0
Glue	Component anchoring	AB Glue is not allowed (fix component, thermal glue…)
Red Phosphorus	Material	Red Phosphorus must not be used as flame retardant in any part of the power supply especially AC inlet and DC cable / plug.
AC fly leads / wire	AC socket	-Must to use fly leads / wire to solder AC inlet to PCB. -AC Socket Vendors : SOLTEAM, TECX -Certification : Must meet WW requirements -Apply latest certification regulation
AC Prong	AC socket	Must use inject molding process to fix with AC socket plastic housing.
PCB	PCB Board	Low Halogen
Shied	Heatsink or EMI shielding	Lock / fix mechanism (at lease 2 on each side) is requested
Terminal material	DC output cable	Phosphor bronze or better

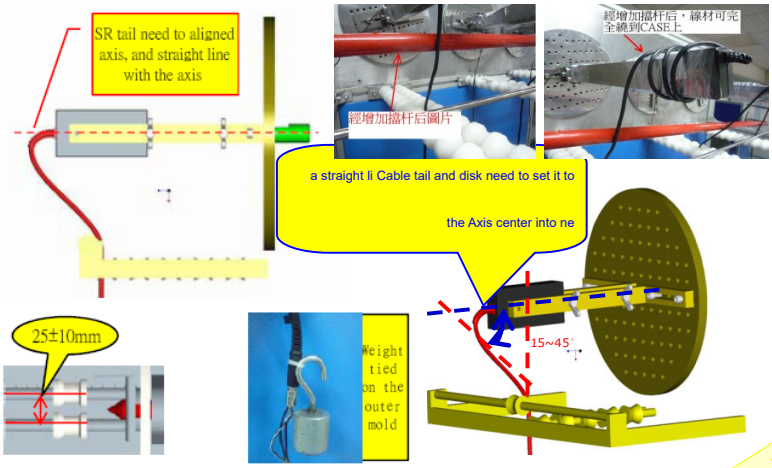
9. MECHANICAL

Item		Conditions					Specification
1.	Bending test	Bead core - DC cord					
		Load	Angle (θ)	Arbitrary direction	Cycles in every minute	Sample size	
		200 g	±90°	5000 Cycle	40 Cycles	5 Pcs	Disconnection rate of the wire shall be 30% or less, without damage to the insulations, etc..
		DC plug over mold					
		Load	Angle (θ)	Arbitrary direction	Cycles in every minute	Sample size	
		200 g	±180°	1000 Cycle	40 Cycles	5 Pcs	Disconnection rate of the wire shall be 10% or less, without damage to the insulations, etc..
		200 g	±180°	5000 Cycle	40 Cycles	5 Pcs	Disconnection rate of the wire shall be 50% or less, without damage to the insulations, etc..
		200 g	±180°	Until broken	40 Cycles	5 Pcs	
		Case SR					
		Load	Angle (θ)	Arbitrary direction	Cycles in every minute	Sample size	
		200 g	±180°	1000 Cycle	40 Cycles	5 Pcs	Disconnection rate of the wire shall be 20% or less, without damage to the insulations, etc..
		200 g	±180°	5000 Cycle	40 Cycles	5 Pcs	Disconnection rate of the wire shall be 100% or less, without damage to the insulations, etc..
		200 g	±180°	Until broken	40 Cycles	5 Pcs	
		The test sample is hung by specified weight. It shall be bent through angles of specified degrees in one direction, returned to its original position, then bent specified degrees in the opposite direction, after which it shall be returned to its original position to complete one cycle. The rate flexing shall be specified cycle per min.					

Item		Conditions	Specification
2.	Winding test		Disconnection rate of the wire shall be 50% or less, without damage to the insulations, etc..

Load	Angle (θ)	Arbitrary direction	Cycles in every minute	Sample size
200 g	+/-1080°	4000 Cycle	2 Cycle	3 Pcs

Only for horizontal side. 纏繞線材需完整的繞在 CASE 上

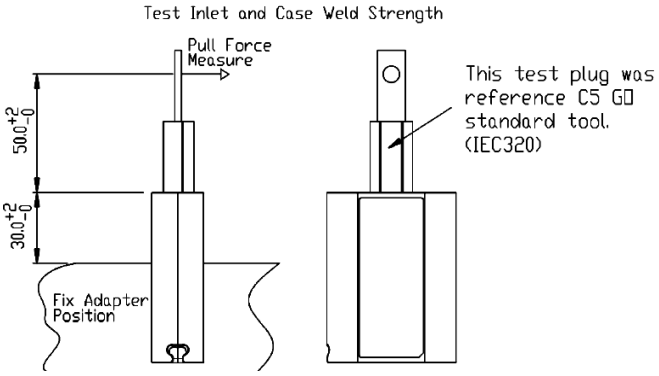


Winding Test SOP

1. Base on Test Condition to set up winding machine (for example frequency, the numbers and laps etc...).
2. Block width (25±10mm) Debugging machine. Then tested the cable tail.
3. PLUG out mold side going to bend and tie it up, then follow hang weights request to hanging to the out mold.
4. Make sure winding setting parameters, after confirm then going winding test.
5. After finish winding test，remove cable and dissection step by step.

3.	Vibration	Only endurance conditioning by sweeping shall be made. 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.	Output voltage ± 0.5V. Dielectric strength：Without ignition smoke, damage, arcing or breakdown. Insulation resistance ：100MΩ or more Appearance：There shall be no blistering of the specification label or other damage to the construction.
4.	Shock	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.	Output voltage ± 0.5V Dielectric strength：Without ignition smoke, damage, arcing or breakdown. Insulation resistance：100MΩ or more. Appearance：There shall be no blistering of the specification label or other damage to the construction.
5.	Drop test	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.

5.1	Tumble test	a. Drop height: 50 cm b. Tumble cycles: 30 Cycles(60 times) c. Other detail test condition and Criteria refer to 10000-0258	
6.	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.
7.	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

8.	AC socket test	1. Adapter is fixed by fixture and body of adapter extend 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. 	We stop pull force immediately when socket structure creak and see inside components directly. We test each side once time for 5 pcs sample to take data. The force must be over 15Kg
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.

<table>
<tr>
<td>10.</td>
<td>Acoustic Noise</td>
<td>Position the microphone ten (10) centimeters above the x-y center of the AC Adapter.

Allow the AC adapter to warm-up for a minimum of 30 minutes prior to starting the test

Take a measurement with the AC Adapter configured for each of the test cases below:

(1). 0~Full Load : < 25dB
(2). No Load - 120Vac/60Hz
No Load - 240Vac/50Hz
Nominal Load - 120Vac/60Hz
Nominal Load - 240Vac/50Hz
Maximum Load - 120Vac/60Hz
Maximum Load - 240Vac/50Hz

Table – AC Adapter Acoustic Noise Levels

<table>
<tr><th>Frequency (Hz)</th><th>Mag dBA re 20 µPA</th></tr>
<tr><td>630</td><td>5.0</td></tr>
<tr><td>800</td><td>7.5</td></tr>
<tr><td>1 k</td><td>9.0</td></tr>
<tr><td>1.25 k</td><td>12.0</td></tr>
<tr><td>1.6 k</td><td>11.0</td></tr>
<tr><td>2.0 k</td><td>12.0</td></tr>
<tr><td>2.50 k</td><td>12.0</td></tr>
<tr><td>3.15 k</td><td>12.0</td></tr>
</table>
<table>
<tr><th>Frequency (Hz)</th><th>Mag dBA re 20 µPA</th></tr>
<tr><td>4.00 k</td><td>12.0</td></tr>
<tr><td>5.00 k</td><td>11.0</td></tr>
<tr><td>6.30 k</td><td>10.0</td></tr>
<tr><td>8.00 k</td><td>9.0</td></tr>
<tr><td>10.00 k</td><td>8.0</td></tr>
<tr><td>12.50 k</td><td>7.5</td></tr>
<tr><td>16.00 k</td><td>13.0</td></tr>
<tr><td>20.00 k</td><td>20.0</td></tr>
</table>
</td>
<td>Pass/Fail Criteria

Please refer to the Table</td>
</tr>
<tr>
<td>11.</td>
<td>Adhesion of specification labels</td>
<td>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.</td>
<td>There shall be no blistering or peeling of the specification label.</td>
</tr>
</table>

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 铆接處沒有晃動, 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.	Outline dimension Case Color		75*53.3*22 Color: black
14.	Weight		110+/-10g
15.	AC Inlet		C6
16.	DC Connector		USB TYPE-C
17.	DC Cable Length		N/A

18	PACKAGE TEST	(1.) DROP TEST, 30-INCH DROP, ALL EDGES, SURFACES — WHILE ENCLOSED IN APPROPRIATE SHIPPING CONTAINER (2.) DROP TEST, TEST CONDITION SEE 10000-0089 (3.) VIBRATION TEST, TEST CONDITION SEE 10000-0089	N/A

Product Application: NB

Product Ingress protection(IP) rating: Not requirement.