ASUS 65W Mini Revised ADAPTER SPEC.

0. History:

REV	Description	Issue Day	Prepared By	Checked By	Approved By
01	First Issue	2019/2/19	Roger Hung		
02	Update 2.2.1 Electrical Update 4.4 Leakage Current	2019/4/16	Roger Hung		
03	Add 2.2.11 Hot Plugging Add 2.2.12 Voltage Dips	2019/5/31	Roger Hung		

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 **1.5A** Irms at 100Vac & Max. load

2.1.4 Configuration

-2 Conductors (Line, Neutral) / 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 rating.

2.1.7 Efficiency

-The power supply shall meet DOE VI / COC V5 Tier 2 spec measuring at the cable end.

2.2 Output Requirements:

2.2.1 Electrical

No.	Item	Condition	Specification
1	Output Voltage	Rating	19V
		Output Voltage Range	18.5~20.5V
		Ripple & Noise	300mV
2	Output Current	Operation Max.	3.42A
		Operation Min.	0A
3	*Transient Load Current	Current	0.05~3.42A
		Transient Frequency	100Hz ~ 100KHz
		Slew rate	2.5A/us
		Criteria	The output voltage regulation shall be less than ± 5%

* Ripple noise measure by **20M** Hz bandwidth in oscilloscope and applied **0.1uF** high frequency capacitor and **10uF** electrolytic capacitor across output connector terminals.

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 20.5 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 5ms after lost of input voltage measured at 100Vac and 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 no load power consumption is less than 0.075W at 115Vac/60Hz and 230Vac/50Hz

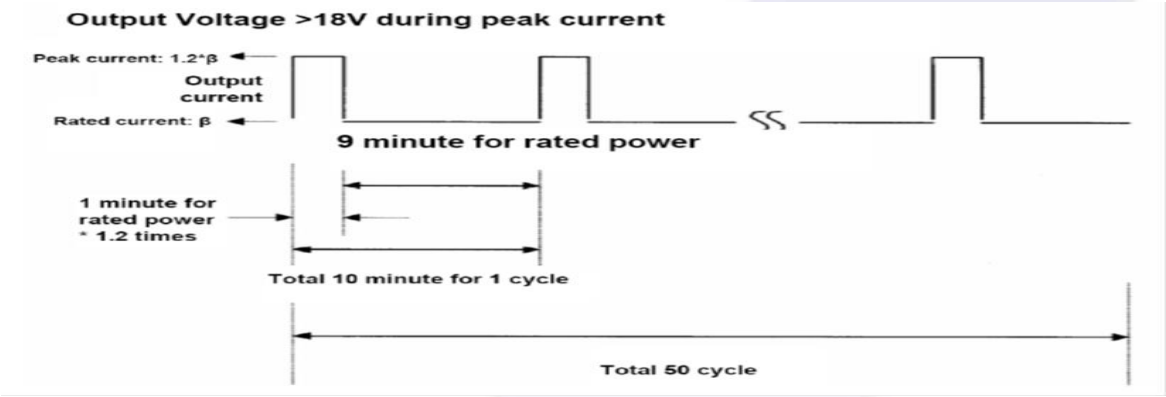
2.2.8 Power saving requirement

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

Output Power (W)	Pin Power (W)
18	< 21.0
11	< 14
3	< 5
1.65	< 3
1.5	< 2.2
1	< 1.6
0.25	<0.45

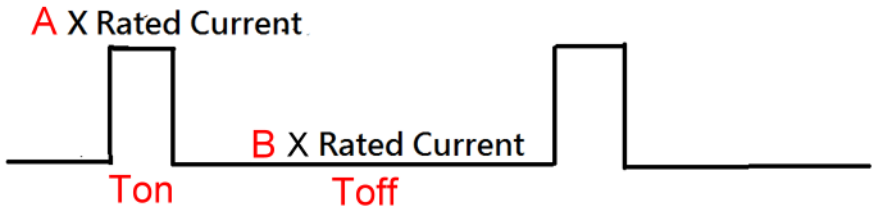
2.2.9 Surge load :

The adapter shall support a surge load with 120% of maximum load for 1min, maximum load for 9min and output voltage shall be more than 18V at 100-240Vac/50Hz-60Hz.



2.2.10 Peak load :

The adapter shall support below loading condition without any damage, safety issues and protection happened. The output voltage shall be more than 17V at input voltage 100-240V/50Hz-60Hz.



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 1000 uF capacitance shall not trigger any protections or cause the adapter to shut down.

2.2.12 Voltage Dips

-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

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

2.3 Power Output Protection:

2.3.1 Over Current Protection (OCP)

-The maximum constant current shall between 4.1A~5.4A at 90Vac/264Vac.
-The adapter shall be auto-recovery and no component damaged.
-Meet LPS.
-The adapter cannot have any safety issue or be damaged when the load condition is before over current protection point (OTP is allowed).

2.3.2 Over Voltage Protection (OVP)

-The maximum voltage shall be under 27V.
-The adapter shall be latch-off and no component damaged.

2.3.3 Short Circuit Protection (SCP)

-The adapter shall be auto-recovery and no component damaged.

2.3.4 Over Temperature Protection (OTP)

-The adapter shall be latch-off and no component damaged.
-No fire and no melted of the enclosure.

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˚C

3.2 Life/Power On Hours

-The power supply must be designed to operate for 13,140 power on hours.

-AC input voltage: 100 and 240Vrms

-Ambient Temp. : 25˚C

3.3 Burn-in Test Condition

- More than 4 hours at 40˚C, normal input voltage.
- AC on/off must be tested.

3.4 Surge Voltage (For 450V Type Only)

-Follow *ASUS RD Test Plan for NB Adapter Rev04*

4. Safety & EMC:

4.1 Safety Certificate

- The power supply unit shall follow the safety standard (IEC60950 , IEC62368)
- Certificate : Follow safety control table
- Trademark : 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 4242Vdc for 1minute
-Primary to F.G :1.5KVac for 1minute

4.4 Leakage Current

-The power supply leakage current shall be less than 20 uA @240Vac/50Hz

-Test with AC cable 90cm (DT Type)

4.5 Surge & Impulse Test

-Lighting Surge : ±1KV (L-N) ; ± 2KV (L-FG; N-FG)

-Impulse Noise Test: 1KV

-Criteria A

4.6 EMI standard

-The power supply shall comply with a following RFI/EMI standards when tested in a system configuration.

-F.C.C part15

-CISPR22 class B

-The limits shall be meet with a margin more than 6dB with all system 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 B

±12KV air discharge Performance Criterion A.

±8KV contact discharge Performance Criterion A.

5. Environment Requirements:

5.1 Temperature

-Operation: 0~40˚C ;Storage: -30~80˚C

5.2 Humidity (no condensing)

-Operation: 5~90% ; Storage: 5~95%

5.3 Surface Temperature rise

- Follow *ASUS RD Test Plan for NB Adapter Rev04*

5.4 Acoustic test:

Input Condition

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

Load Condition:

Dynamic Load : Follow ASUS Transient Load Current Spec

Static Load : From 0A to Full Load , 0.1A per step

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**

6. Mechanical Requirements:

6.1 Bending test:

- 200g weight,90° angle to each side(Total angle 180°),3000 cycles of arbitrary direction 40 cycles/min.
  Disconnection rate <= 10% between case to S/R
  Disconnection rate <= 30% between plug to coil
  Without damage to the insulations

6.2 Winding test:

-200g weight,1080° angle on X-axis and Y-axis ,500 cycles of each direction 4 cycles/min.
Disconnection rate of the wire shall be less than 30%

6.3 Drop Test

Drop 8 times (**6 faces and 2 AC plug corners**) on each cycles from a height of 1.0M onto a **concrete surface.** Increase the height in steps of 0.2M until the case is broken. Must has 10cm margin during design stages

Electrical

- The unit should meet all specification and no function error after test.1.1M testing

Mechanical

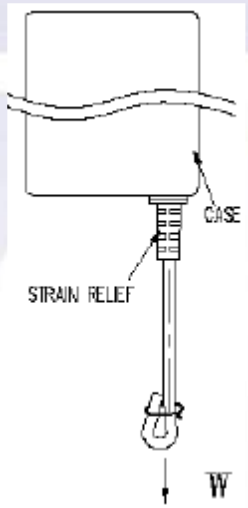
- There shall be no visual damage and safety concern after 1.5M testing

6.4 Tensile Test :

Load : 10Kgf at Plug end and Bushing each for 1minute

Angle: 90° /180°

Criteria: The withdrawal of cord should be less than 2mm or without disconnection of cord



6.5 DC Power Cord Wire Push Test

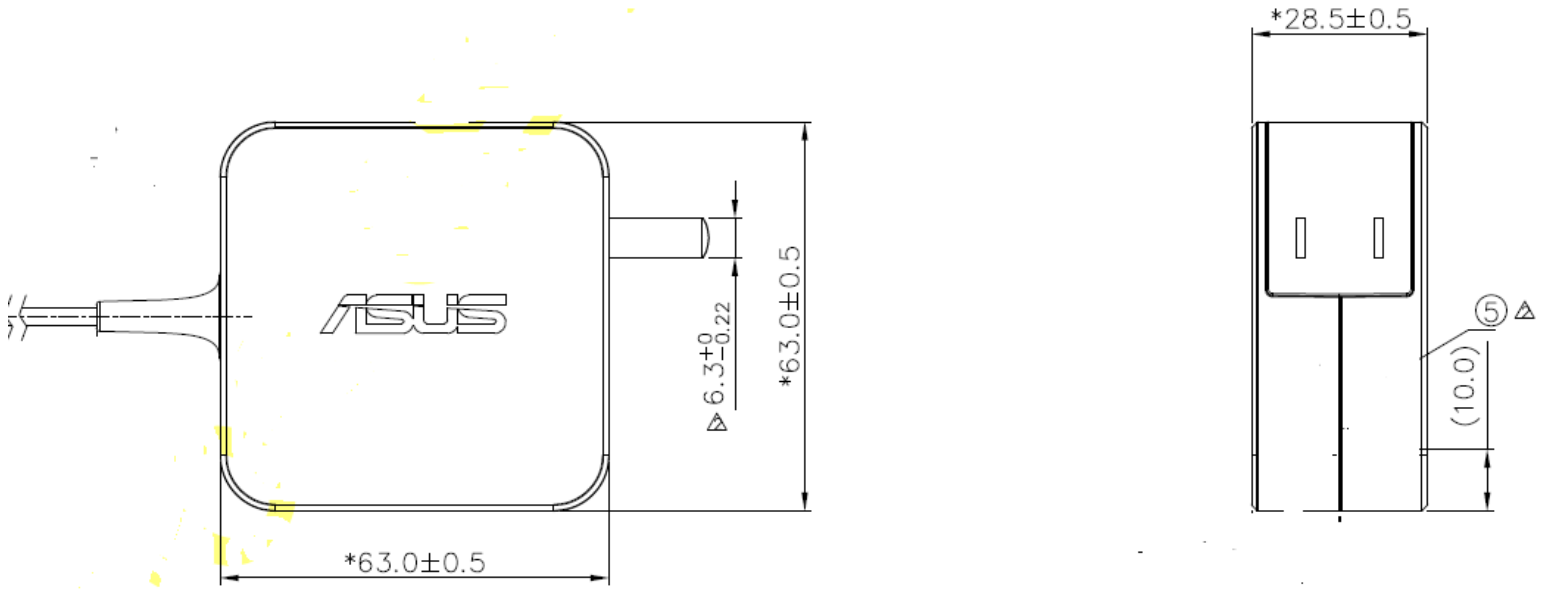
Test condition : a) Fixture: 6mm, 10.5mm & 20mm aluminum block and ψ12mm aluminum bar

b) Increase pressure by speeding up 2 mm per minute on the tested item until maximum force reached to 130 kg

Criteria: After testing the V+ wire and Ground wire can't short

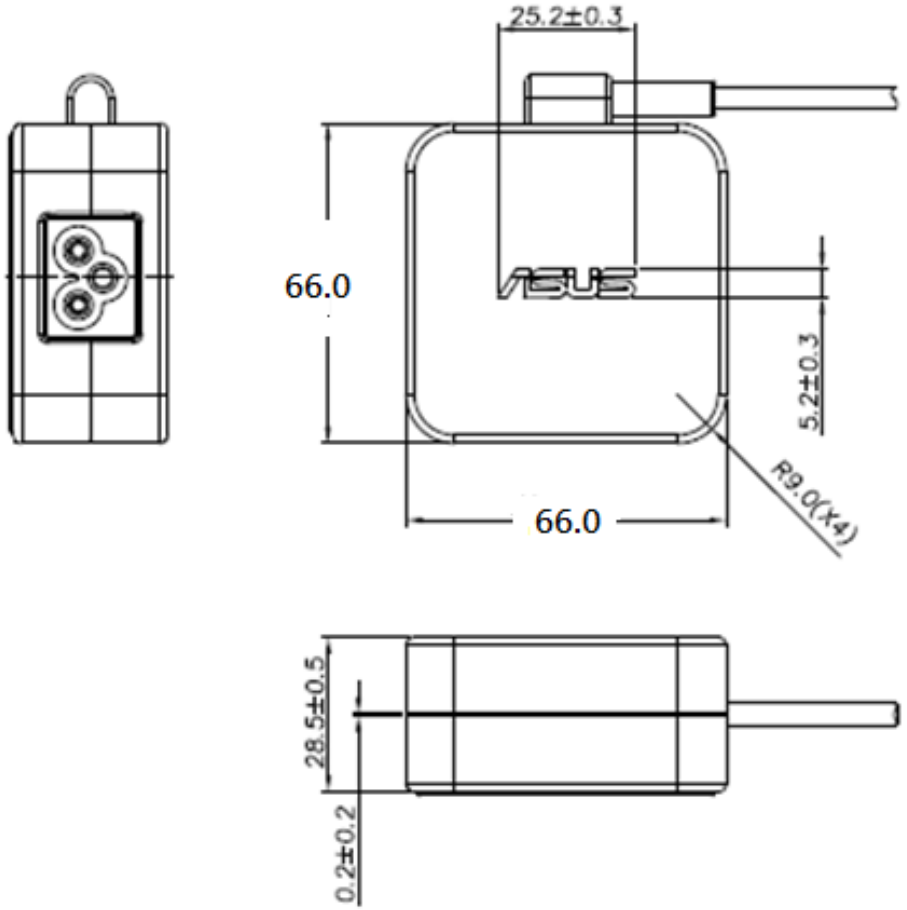
7.1 Power unit Dimension: (Wall Mount Type)

-Dimension **63.0 x 63.0 x 28.5mm:**



7.2 Power unit Dimension: (Desktop Type)

-Dimension **66.0 x 66.0 x 28.5mm**



8. Input AC Inlet:

- For WM Type : Fixed Pin US/EU/CCC
  AC plug material cannot include ferrous alloy
- For Desktop Type : Socket C6 Type

9. Output Cable:

- For WM Type
  - 2300mm ±100mm (ID design by ASUS)
- For Desktop Type
  -1800mm ±80mm (ID design by ASUS)

10. Output Plug:

- Vender : Fuan Gee
- Plug Type : Follow ASUS Requirement
- Plug Internal Resistance : 93.1 kΩ For 4.5 PHI DC Plug (Signal to GND)

11. Environmental Laws and Regulations

- Meet the deduct 50% condition of Swedish “Law (2016:1067) about tax on chemicals in certain electronic products”.

Thank You!