

POWER SUPPLY

User's Manual (English Edition)

Models : ZM300B-APS
ZM400B-APS

ATX Ver. 2.03 / ATX 12V Ver. 1.3



Please read this manual first before using the product.

1. Safety Precautions

- The following safety precautions and directions for use are meant to prevent accident and injury. Please read thoroughly before using the product.

Warning

Serious injury can occur.

- ▶ Opening the cover of the product while the power cord is plugged into the outlet can result in electrocution.
- ▶ Handling the power cord with wet hands can result in electrocution.
- ▶ Inserting fingers or metallic objects into the cooling fan at the back of the product can result in injury or electrocution.

Caution

Malfunction or degradation of product performance and lifespan can occur.

- ▶ Operating in an extremely cold or hot environment can degrade product performance and lifespan.
- ▶ Allowing liquid to get into the product can result in malfunction.
- ▶ Operating in a humid or non-ventilated environment can reduce product lifespan.

2. Components

- 1) One Power Supply
- 2) One Multi-connector(ZM-MC1) for Fan
 - ☞ (Use this to supply power to extra fan. See page5 for details.)
- 3) One Power Cord for AC Power Source (Not included in some countries)
- 4) One User's Manual

3. Notes on Installation

- * To ensure safe and easy installation, first read the Safety Precautions above and then read the following notes.
- Plugging the main power connector P1 into the main board while the product is connected to the AC power source may result in damage to the main board.
- Do not insert the DC output connectors too forcibly into devices as the shape of the connector is meant to prevent incorrect insertion.
- If, after installing the product, the Power On light on the case does not light up when the main power button is pressed, some devices may be plugged in incorrectly or the main board may be faulty. Please double-check the installation. Please read this manual first before using the product.

*For more information on the product, please visit our website at www.zalman.co.kr.

4. The Zalman Advantage

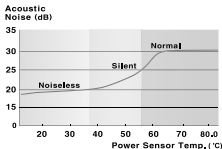
With the goal of enhancing the computing environment, all Zalman Tech products are noise-free. This product is a noise-free 300(400)W ATX Ver. 2.03 / ATX12V Ver. 1.3 power supply supporting Intel Pentium 4 and AMD CPUs.

■ Realizing a Noise-Free Computing Environment (CNPS) with Auto Control Cooling Fan

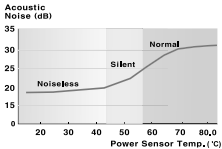
By implementing heat-sensor circuitry that controls the cooling fan's speed (rpm) in relation to the temperature within the power supply, emanating noise has been greatly reduced. The graph below shows the CNPS characteristics of our product.

※ CNPS (Computer Noise Prevention System) refers to a system that reduces a conventional computer's noise (30dB or more) to an inaudible level (20dB or less). In order to create a true noise-free computer, Zalman's NP CPU Cooler and NP Video Card, along with an NP HDD from popular manufacturers should be used together with this product.

Fig.1: Noise Level(dB) Changes In relations to Power Supply's Internal Temperature



1) Noise Level (dB) of ZM300B-APS



2) Noise Level (dB) of ZM400B-APS

※ The above results show that the Zalman product operates in 'Noiseless' or 'Silent' level when the power supply's internal temperature is kept below 56°C and those were obtained in compliance with the 2nd Revision of ISO7779, an international standard for noise level measurement. Results may vary for a different system configuration and/or the test environment.

■ Complies with Intel ATX12V Ver. 1.3

This is the latest product in our power supply line-up, designed to comply with Intel ATX12V Ver. 1.3 S-ATA power connectors supporting S-ATA Ver. 1.0 compliant hard disk drives are provided as standard.

☞ For information on how to use the S-ATA power connector with a S-ATA HDD, please refer to the output power cable diagram on page 5.

■ Certified with Safety Approval, EMC Standards



*For more information on the product, please visit our website at www.zalman.co.kr.

■ Improving Power Factor & Eliminating Harmonics through Active PFC

By implementing Active PFC, the power factor (PF) is improved from 75% (Passive PFC) to 94% (at full load), while harmful harmonic frequencies are reduced below regulatory requirements.

■ Simplifying Source Input - Free Voltage

This product can be used with any normal AC input source ranging from 100VAC to 240VAC.

■ High Efficiency Power Supply

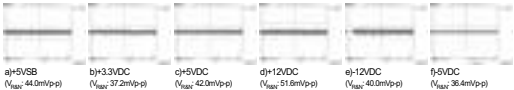
Designed with a high switching frequency and low power-loss circuitry, the efficiency of this product exceeds 75% (at full load).

■ Strict DC Voltage Regulation & Low Output Ripple / Noise

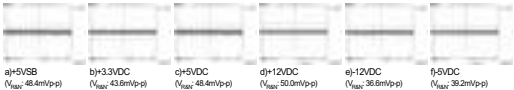
The following figures show the ripple and noise measured from the DC output of this product.

Figure 2. DC Output Ripple & Noise Waveforms

1) ZM300B-APS



2) ZM400B-APS



※ The data above was measured according to the Intel ATX Ver. 2.03 / ATX12V Ver. 1.3 Power Supply Specifications.

Conditions : Each DC output had a 0.1 μ F ceramic capacitor and a 10 μ F electrolytic capacitor attached as the bypass and the oscilloscope (input impedance 1M Ω) measured the waveforms at 20MHz frequency bandwidth. The waveforms may differ with varying measurement conditions.

*For more information on the product, please visit our website at www.zalman.co.kr.

5. Specifications

■ Electrical Characteristics and International Safety Approval

AC Input Range	Voltage	100VAC ~ 240VAC ± 10%		ZM 300B-APS					
	Frequency	47Hz ~ 63Hz		Vout	Output Load Rating			Combined Power	
AC Input Current (Rated)	ZM 300B-APS		ZM 400B-APS		Imin	I _{max}	I _{peak}		
	115VAC	10A		+5VSB	0.0A	2.0A	2.5A	180W	280W
	230VAC	5A		+3.3VDC	0.3A	28A			
PFC Type	Active PFC			+5VDC	0.1A	30A			
Power Factor	>85%(Typical) @ 115VAC			+12VDC	0.0A	18A	19.5A		
Inrush Current Limit (@ Cold start at 25°C)	ZM 300B-APS		ZM 400B-APS	-12VDC	0.0A	0.8A			
	115VAC	60A	80A	-5VDC	0.0A	0.3A			
	230VAC	90A	120A	ZM 400B-APS					
Efficiency	75% minimum@ 230VAC (Full Load)			Vout	Output Load Rating			Combined Power	
DC Output Voltage Regulations	Regulation Range		at Full load		Imin	I _{max}	I _{peak}		
	+5VSB	±5% +4.75V ~ +5.25V		+5VSB	0.0A	2.0A	2.5A	235W	380W
	+3.3VDC	±5% +3.14V ~ +3.45V		+3.3VDC	0.3A	28A			
	+5VDC	±5% +4.75V ~ +5.25V		+5VDC	0.1A	40A			
	+12VDC	±5% +11.4V ~ +12.6V		+12VDC	0.0A	18A	19.5A		
	-12VDC	±10% -10.8V ~ -13.0V		-12VDC	0.0A	0.8A			
	-5VDC	±10% -4.50V ~ -5.50V		-5VDC	0.0A	0.3A			
DC Output Ripple & Noise	Vout	Specification		Protection					
	+5VSB	50mV		Over-Voltage Protection(OVP)					
	+3.3VDC	50mV		Over-Current Protection(OCP)					
	+5VDC	50mV		Short-Circuit Protection(SCP)					
	+12VDC	120mV		EMC(EMI & EMS)					
	-12VDC	120mV		FCC Part 15 Class 'B' , CISPR22 Class 'B'					
	-5VDC	100mV		Safety Approvals					
UL1950, C-UL, CE, TUV, CB-NEMKO									

■ Dimensions

	ZM300B-APS	ZM400B-APS
SIZE (L x W x H)	140mm x 150mm x 86mm	

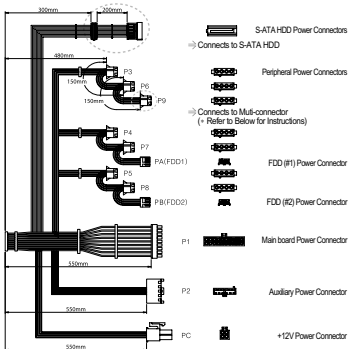
■ Operating Conditions

Ambient Temperature	Operation	0°C ~ 50°C
	Storage	-20°C ~ 80°C
Ambient Humidity	Operation	5% RH ~ 95% RH
	Storage	5% RH ~ 95% RH

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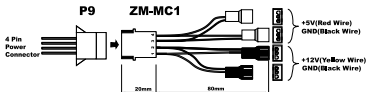
■ Output Power Cable Specifications

Cable Lengths & Connector Names



Using the Multi-Connector (ZM-MC1)

Multi-Connector Diagram



How to Use

The Multi-connector, included free in every Zalman power supply, is used to supply +5V or +12V power to any additional fans that a user may wish to install. Connect it to the power supply's output connector (P9) and simply attach the fans to the 3-pin connectors at the other end.

※ The specifications of any product may change without prior notice to improve the performance thereof.

*For more information on the product, please visit our website at www.zalman.co.kr.

Explanation of Technical Terms

■ PFC (Power Factor Correction)

In a conventional power supply with switching regulators, a rectifying circuit that converts an AC input source into a DC source for the primary circuit is used. In this rectifying circuit, a capacitor with a large capacitance is used to soften transient response and reduce ripple so that the switching regulator is not over-stressed. However, the peak charge of the capacitor becomes greater with greater capacitance, and this leads to non-linear bursts of peak over-current into the primary circuit. Such peaks of current distort output voltage, create harmonic frequencies, and reduce power factor. There is now an international standard for controlling harmonics (IEC100-3-2) and PFC is mandatory for home appliances consuming 70W or more power in EU nations as of January, 2001. This PFC circuit is largely classified into two types: active and passive.

■ Comparing Active PFC and Passive PFC

1) Active PFC

This uses a switching regulator technology called 'boost-up', using active elements such as IC, FET and diodes, to create a PFC circuit. This circuit has a theoretical power factor of over 95%, accepts a full range (90VAC ~ 260VAC) of AC input, and reduces total harmonics noticeably. However, it needs a complicated EMI filter and an input source circuit, and is costly to build. Zalman Tech's ATX /ATX12V power supply uses this type of PFC.

2) Passive PFC

This type of PFC uses passive elements such as a ferrite inductor on the input source to create a countering reactance. While this can be easily applied to the existing power circuitry without much modification, the power factor is low (60 ~ 80%), the AC input must be chosen (115VAC / 230VAC), and the harmonics produced from the difference between the capacitance and the inductance are hard to control. Therefore, there is a possibility that significant electromagnetic noise could result with an 115VAC input source.

■ DC Output Voltage Regulation

DC output voltage regulation is mainly divided into AC line regulation (stability of DC output in relation to fluctuation in AC input) and load regulation (stability of DC output in relation to fluctuation in load). The regulation is largely dependent on the system design specifications, and in the case of an ATX/ATX12V power supply, it must be within 5% or 10% of the nominal output voltage (i.e. $+5V \pm 5\% \rightarrow +4.75V \sim +5.25V$). Should a voltage outside this range be supplied to the system, the system may malfunction.

■ DC Output Ripple Voltage & Noise

A ripple is normally defined as the peak-to-peak voltage (or current) caused by an imperfect rectification of an AC source. In the case of the ATX / ATX12V switching regulator, ripple factors from the low-frequency AC input source, the high-frequency (tens to hundreds of KHz) switching, and impulse noise contribute to the DC output ripple. This ripple and impulse noise can be reduced to below regulation limit by inductive canceling within the rectifier circuit, but if the output ripple exceeds the limits and is carried into the system, the logic level of active elements becomes unstable and the system can malfunction.

Normally, the listed DC output ripple and noise (measured in voltage, in scales of mVp-p) is solely of the switching regulator and excludes that of the AC input.

*For more information on the product, please visit our website at www.zalman.co.kr.

6. Product Warranty (International)

Thank you for purchasing Zalman Tech's product.

Warranty - If this product is not free from defects, Zalman Tech guarantees that it can be exchanged for a functioning one within one (1) year from the time of purchase.

❖ Product exchange is done with the reseller that the product was purchased from. For further inquiries, contact Zalman headquarters at **www.zalman.co.kr** or e-mail the representative.

There will be no exchanges in the following cases:

- A) On violation of the Safety Precautions and the Notes on Installation in this manual
- B) On a deliberate, accidental, or careless mishandling leading to external damage, instability of output, or breakdown of components
- C) On a natural disaster leading to human fatality and/or property damage

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