



Resonant Switching Power Supply

ZM500-RS

Sales Guide

May, 2009

1. Summary



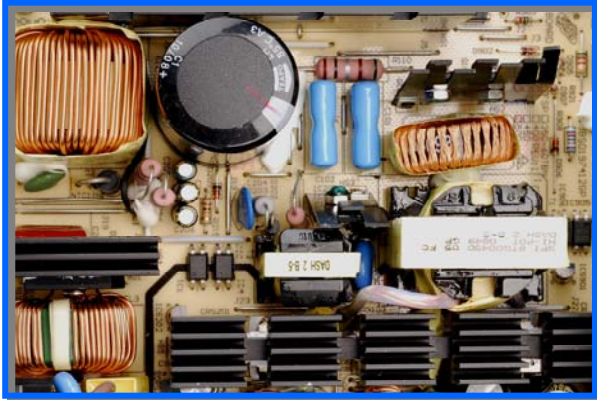
- ✓ Resonant Switching Circuit Design
- ✓ 80 PLUS® Certified
- ✓ ATX12V v2.3 Applied
- ✓ Dual +12V DC Output Design
- ✓ Supports Dual Graphic Cards
- ✓ Ultra Quiet 120mm Fan

1. Summary



- ✓ Improved Power Factor & Reduced Harmonics through Active PFC
- ✓ ATX20+4-Pin Main Connector
- ✓ Supports ATX12V CPU 4-Pin & EPS12V CPU 8-Pin
- ✓ Multiple Safety Features
- ✓ Complies with WEEE & RoHS Environmental Directives of the European Union
- ✓ International Safety and EMC Certifications

2. Features



✓ RS Technology (Resonant Switching Circuit Design)

Compared to Two-Forward Switching, the more advanced Resonant Switching minimizes 'switching loss' reducing heat generation, and operates more efficiently by eliminating the need for an output inductor leading to outstanding stability and reliability.

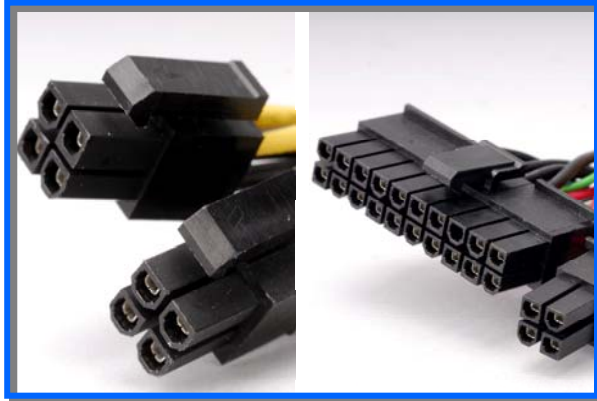


✓ 80 PLUS® Certified High Efficiency Design

This power supply is 80 PLUS® certified with 87% maximum efficiency(230VAC, Typical Load) incorporating a high switching frequency & low power loss circuitry design, and guarantees higher efficiency compared to uncertified products.

※ 80 PLUS® is an energy efficiency certification program administered by Ecos Consulting of the U.S.A.

2. Features



✓ Supports ATX12V v2.3

Incorporates the latest power supply design and supports many types of CPUs, motherboards, and graphic cards.



✓ Dual Independent +12V DC Rails

Dual +12VDC Rails supply power independently to the CPU, VGA, motherboard, and peripherals for stable operation of core components.

2. Features



✓ Dual Graphic Cards Support

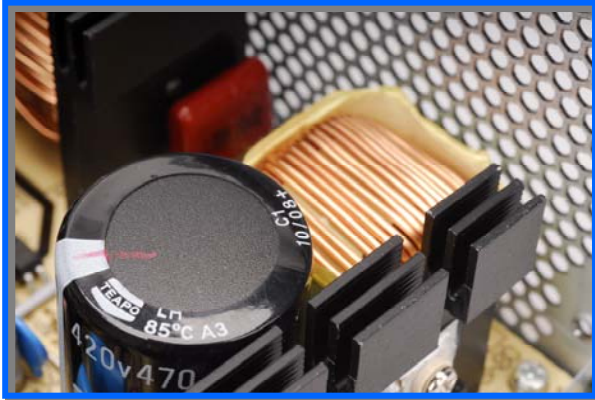
6-Pin and 6+2-Pin PCI-E Connectors are provided for dual graphic card setups.



✓ Ultra Quiet 120mm Fan

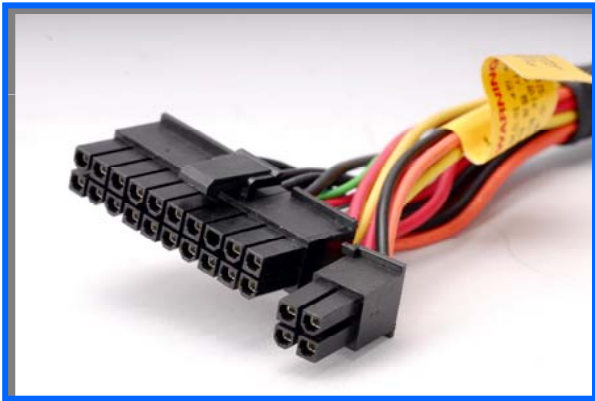
An ultra quiet Hydro Bearing cooling fan increases airflow while minimizing noise for an ultra quiet computing environment.

2. Features



✓ Active PFC for Improved Power Factor & Reduced Harmonics

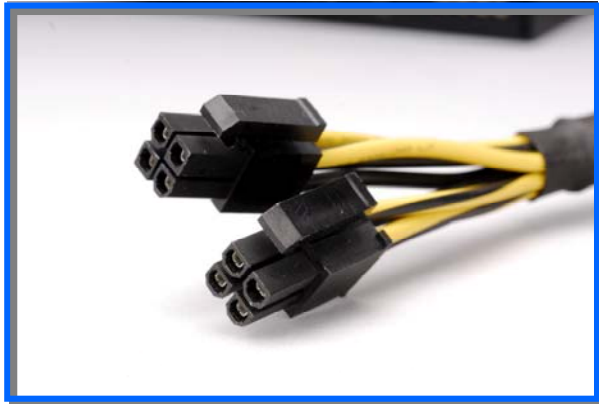
By implementing Active PFC (Power Factor Correction), instead of Passive PFC with a Power Factor (PF) of 75%, the PF is improved up to 99% while harmful harmonic frequencies are reduced to meet the Line Harmonic Distortion Requirement of EC61000-3-2 Class D.



✓ ATX20+4-Pin Mainboard Power Connector

ATX20+4 Pin enhance compatibility for both 20pin and 24pin type motherboard power connectors.

2. Features



✓ Supports ATX12V CPU 4-Pin & EPS12V CPU 8-Pin

Two ATX12V CPU 2+2 (4-Pin) power cables can be combined to form an EPS12V CPU 8-Pin power cable.



✓ Multiple Safety Features

Over-Voltage Protection, Over-Current Protection, Short-Circuit Protection, Under-Voltage Protection, and Over-Temperature Protection.

2. Features



✓ WEEE & RoHS

ZM500-RS Complies with WEEE & RoHS environmental directives of the European Union.



✓ International Safety and EMC Certifications



2. 1. Advantages of LLC Resonant Half-Bridge Converter (RS Technology)

✓ Higher Efficiency

- Zero Voltage Switching (ZVS) incorporated voltage conversion virtually eliminates 'switching loss' resulting in higher efficiency.
- Unlike regular PSUs that only operate according to the manufacturer's efficiency claims when the load on the PSU is within a limited range, the ZVS of ZM500-RS operates at all loads within its operating range providing higher efficiency at all times.

✓ Stability

- Soft Start prevents sudden shifts in current.
- The ZVS feature also prevents sudden shifts in current and minimizes any switching noise at the 1st switch as well as any electromagnetic waves.
- Unlike regular PSU's, resonant switching PSUs do not generate the heat associated with switching loss, and therefore, reinforce stable operation.

✓ Quiet Operation

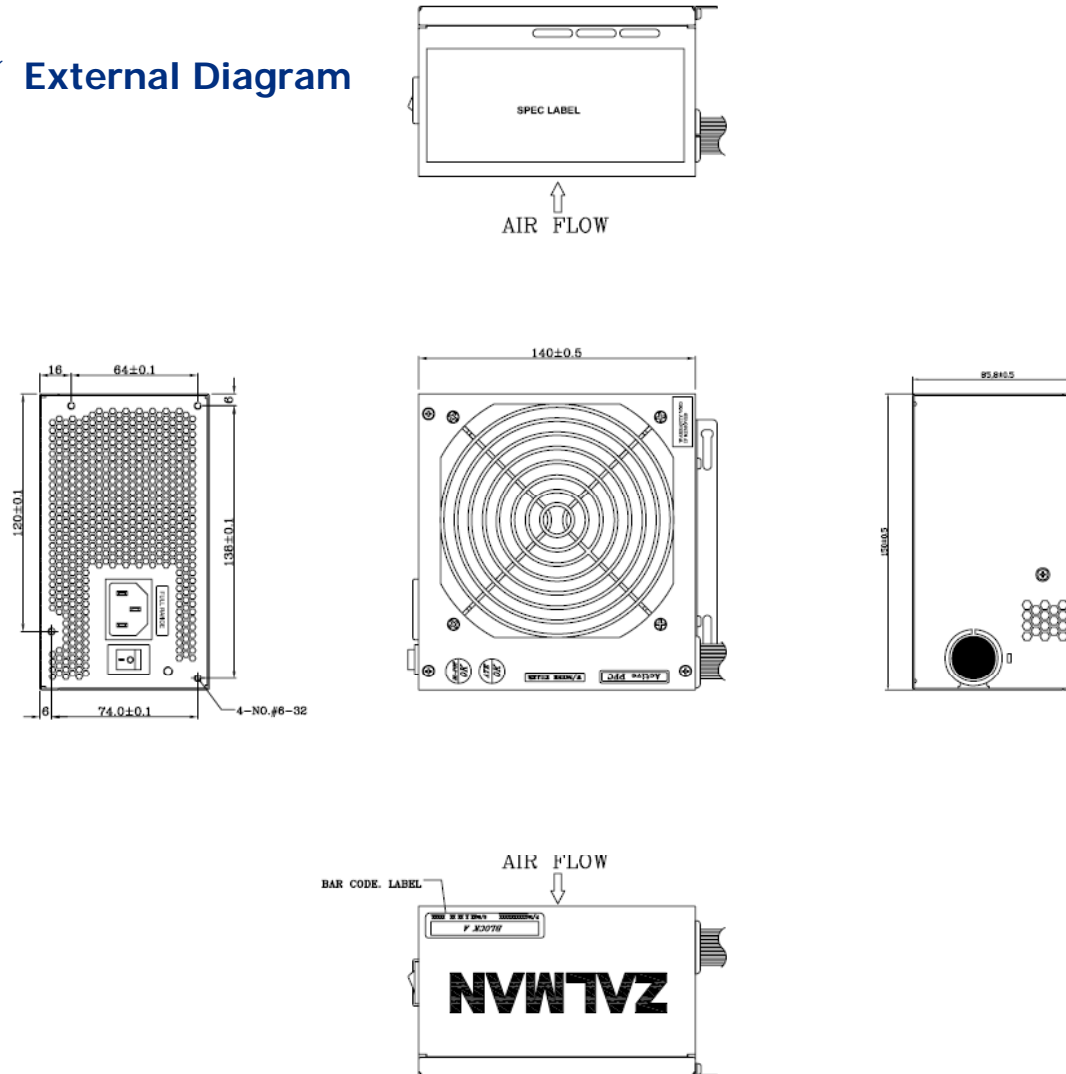
- Eliminates the need for an output inductor, a potential source of noise.
- The overall efficiency reduces heat generation facilitating low fan speeds and quiet operation.

3. Product Details

✓ Product Dimensions

- 140(L) X 150(W) X 86(H)mm

✓ External Diagram



3. Product Details

✓Product Information

AC Input Range	Voltage	100VAC~240VAC \pm 10%
	Frequency	50Hz~60Hz
AC Input Current (Rated)	115VAC: Less than 8A	230VAC: Less than 4A
PFC	Maximum Active PFC 99%	
Cooling Fan	Specifications	120mm, Hydro Bearing, 25T
	Fan Speed	12V- Less than 1800rpm
Protection Features	Over Voltage Protection (OVP) Over Current Protection (OCP) Over temperature Protection (OTP)	Under Voltage Protection (UVP) Short Circuit Protection (SCP)
Noise Level	Less than 27decibles (From 1m Distance)	
Efficiency	At least 80% or higher (@115/230VAC, Light/Typical/Full load), Up to 87%(@Typical Load)	
CPUs Supported	Intel	Supports up to Quad Core CPUs
	AMD	

3. Product Details

✓ Cable Connectors

Classification	Types	Quantity	Additional Information
Connector Types	ATX Main	1EA	20+4-Pin Black Connectors
	ATX 12V CPU	1EA	4+4-Pin Black Connectors
	PCI-Ex VGA 6pin	1EA	Black
	PCI-Ex VGA 6+2-Pin	1EA	Black
	SATA	6EA	Black
	ODD/HDD	2EA	Black
	FDD	1EA	Black
Cable Length	450mm		
Cable	Sleeved Cables		

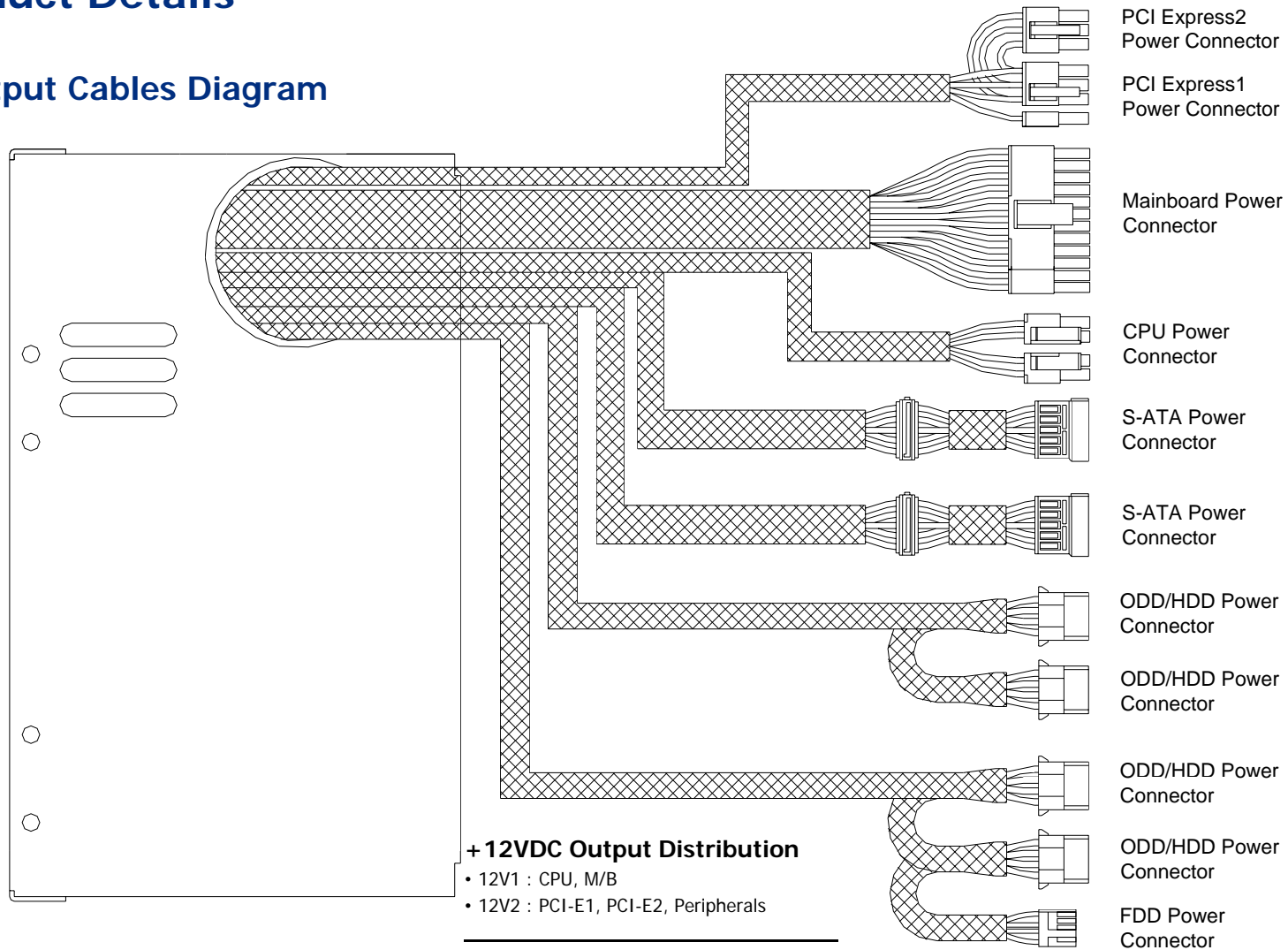
3. Product Details

✓Output Specifications

Output	Minimum Load	Maximum Load	Load Reg	Line Reg	Ripple	Noise
+3.3V	1A	24A	±5%	±1%	50mV P-P	100mV P-P
+5V	1A	24A	±5%	±1%	50mV P-P	100mV P-P
+12V1	1A	18	±5%	±1%	120mV P-P	200mV P-P
+12V2	1A	18	±5%	±1%	120mV P-P	200mV P-P
-12V	0A	0.5A	±10%	±5%	120mV P-P	200mV P-P
+5VSB	0A	3.0A	±5%	±5%	50mV P-P	100mV P-P

3. Product Details

✓ Output Cables Diagram



4. Components



Power Supply Unit



Cable Ties



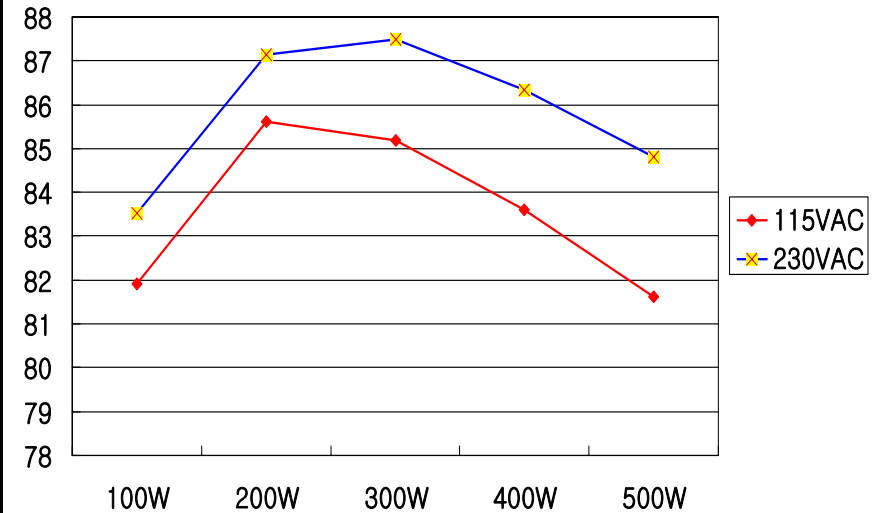
**Power Cord and
User's Manual**



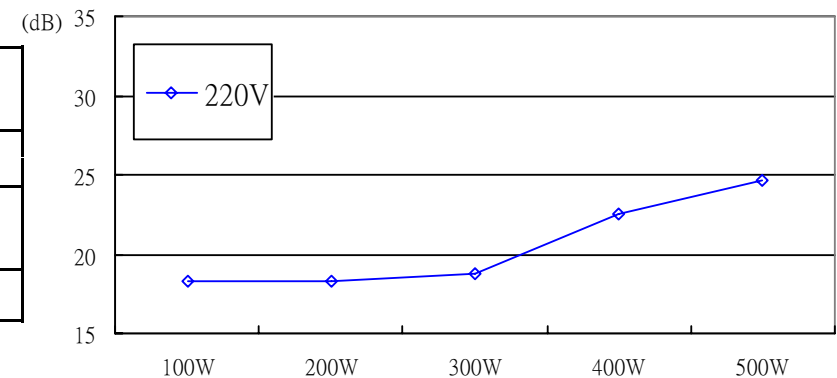
Mount Screws

5. Efficiency and Noise at Various Loads

Load		Power In (W)	Power Output (W)	Current (A)	PFC	Efficiency (%)
500W	115V	612.1W	499.60075W	5.33A	0.996	81.62%
	230V	589.1W	499.60075W	2.57A	0.992	84.80%
400W	115V	479.5W	400.94506W	4.17A	0.997	83.61%
	230V	464.3W	400.94506W	2.03A	0.990	86.35%
300W	115V	354.7W	302.14132W	3.08A	0.996	85.18%
	230V	345.4W	302.14132W	1.51A	0.987	87.47%
200W	115V	236.4W	202.41616W	3.33A	0.995	85.62%
	230V	232.3W	202.41616W	1.75A	0.925	87.13%
100W	115V	122.5W	101.5668W	1.39A	0.972	82.91%
	230V	121.6W	101.5668W	0.78A	0.851	83.52%



Background Noise		100W	200W	300W	400W	500W
16.6dB(A)	Fan RPM	802RPM	804RPM	803RPM	1055RPM	1248RPM
	Fan Voltage	4.48V	4.48V	4.9V	6.8V	7.76V
	dB	18.3 dB	18.3 dB	18.8 dB	22.5 dB	24.7 dB



6. Product Comparison

Specifications	ZALMAN ZM500-RS	Seasonic S12II SS-500GB	Siverstone ST50EF-SC	Thermaltake Lite power W0294RU
Dimensions	140(L) X 150(W) X 86(H)mm	140(L) X 150(W) X 86(H)mm	140(L) X 150(W) X 86(H)mm	140(L) X 150(W) X 86(H)mm
Real Output	500W	500W	500W	500W
Efficiency	80PLUS standard (85.52%)	80PLUS standard (85.47%)	80PLUS standard (85.07%)	80PLUS standard (83.72%)
Noise	18dBA - 25dBA	-	20dBA - 29dBA	-
+12V Max Output	2 Rail, 36A	2 Rail, 34A	2 Rail, 36A	2 Rail, 36A
Fan Type	120mm, Hydro Bearing, 25T	120mm, 2 Ball-Bearing, 25T	120mm, - Bearing, 25T	120mm, 2 Ball-Bearing, 25T
Fan Lifespan	150,000 Hours	-	-	-
SLI/Cross-Fire	Ready	Ready	Ready	Ready
Protection Features	OCP, OVP, SCP,OTP	OCP, OVP, SCP,OTP	OCP, OVP, SCP,OTP	OCP, OVP, SCP
Warranty	3 Year	3 Year	1 Year	5 Year
MTBF	100,000 Hours	100,000 Hours	100,000 Hours	100,000 Hours
ATX12V	Version 2.3	Version 2.3	Version2.2	Version 2.3
Certificates	UL, FCC, CE, CB, KCC	UL, CE, CB ,FCC, TUV	UL, cUL, CB ,FCC, TUV	UL, cUL, CE, CB ,FCC, TUV GOST, BSMI
Environmental Standard	RoHS	RoHS	RoHS	RoHS
MSRP				

7. Q&A

✓ **When the PC is "OFF" (Shut Down), a high pitched noise is audible. Is there a way to make it stop?**

Even when the PC is 'shut down', if the PSU is connected to an AC source and the PSU's power switch is ON, a 'standby power' (+5Vsb) operates to power the motherboard just enough to be in 'standby mode' until the PC is switched ON. To regulate the accumulation of power from becoming excessive during 'standby mode', the power passing through the transformer is turned "off" and "on" in a high frequency. The transformer may react physically by vibrating in that frequency, and if that frequency is within audible range, it will sound like a high frequency noise. If this type of noise is audible from a distance of roughly 30cm(1ft), please notify the place of purchase.

✓ **While playing certain games a high frequency noise is heard. What can I do?**

While playing certain games, the graphic card's power regulators for the GPU and VGA RAM may emit high frequency noise. This may be caused by inadequate capacity of the graphic card's power regulators, and its effects on the PSU. Therefore, if noise can be heard from the graphic card while playing graphics intensive games, please check first with the graphic card's manufacturer to check if there are any problems. If there is not a problem with the graphic card and the noise persists, please notify the place where the PSU was purchased.

✓ **When the voltage is checked using test programs the voltage fluctuates and doesn't seem stable, is the product defective?**

Voltage measurement values in Windows or the motherboard's BIOS may become distorted in the process of analog to digital conversion. For more accurate voltage measurements a digital multi-meter should be connected to the cable's connector.

7. Q&A

✓ There are two extra power connectors on the graphic card. How can I configure for CrossFire or SLI?

The ZM500-RS has a 6-Pin and 6+2-Pin connector which can be used to connect 2 graphic cards, each with a 6-Pin power connector, in CrossFire or SLI configuration. Also, when using a single card with 2 GPUs onboard, both 6-Pin connectors(2 x 6-Pin) or both 6-Pin and 6+2-Pin connectors can be connected to the graphic card for a CrossFire or SLI configuration.

✓ What is the noise level of the fan?

Zalman tested the noise level in ambient temperature of 25°C, resulting in a noise level of 18-25dBA. The noise level can differ depending on the surrounding environment.

✓ Which computer cases can be used to install ZM500-RS?

All standard ATX cases are supported. If the case is slim sized please check with the case manufacturer for compatibility.

※ ZM500-RS's Dimensions: 140(L) X 150(W) X 86(H)mm

✓ Can it be used in server?

The ZM500-RS supports ATX and EPS standards. Not all server motherboards are supported but it can be used on entry level servers.

7. Q&A

✓ How long is the warranty period?

The warranty period is 3years from the date of purchase (sales receipt is required). If the power supply has been modified, disassembled or used improperly, the user may be charged for the repair cost even within the warranty period.

※ If the receipt has been lost the power supply's manufactured date will be referenced instead.

✓ What certifications does it have?

ZM500-RS is UL, FCC, CE, CB and KCC certified.

Thank You