

Choosing the Right Power Supply Part I – Calculate the amount of power you need

Scenario :

You just got that droolmaal rig you have been saving for, now you need to figure out which SMPS/PSU you need to power this thing.

Don't, I repeat don't think that getting a cheap PSU is a good idea, people spend over 10k just for the Motherboard and CPU all to get a 450 bucks SMPS in the end.

Consider this, if CPU is the mind of the system, the SMPS is the heart of the system, it provides the power needed to keep the CPU going on. Now why would anyone want a high and brain and skimp out on the heart.

As **phoenix** said here

<http://www.techencrave.com/forums/things-know-before-buying-perfect-graphic-92235.html>

[Quote]Nowadays , cards requiring you to have at least a good high-wattage PSU like a 600W-700W are there which just will refuse to run on older supplies, or if they do, serious problems like heating and burnout of the GPU can happen. So before yu buy a card, make sure you check its power requirements , and get a PSU which is capable of providing at least equal to, or more than that requirement if you want to keep your card running at full potential. Always compare the Amperage of the PSU and see if it meets the requirements, and always get a good reputed PSU , coz there are lots of supplies out there, which show good Wattage output on the outside, but are nowhere even close to what they claim . Good supplies are Corsair, OCZ GameXtream, Coolermaster etc. [/Quote]

Also, some people have this notion that when you buy a SMPS of high power rating say 600W it will consume 600W all the time. This in NOT TRUE, a SMPS consumes only that much power which is required at that particular moment by the system.

When asking for recommendations for a new Rig/PSU I recommend that one goes through this article and mention the power requirements in the new thread.

This guide will help you calculate the maximum power your SMPS needs to have to provide stable operation to the system.

Consider the following components :

1. CPU
2. GPU
3. Motherboard
4. HDD's
5. DVD RW's
6. Fans
7. Other LED's etc

Note : We will be considering power required at extreme loads as this is what the SMPS must be able to provide when needed, the PSU can always provide lesser power when required.

Lets discuss all these components in detail :

1. CPU : Stock Speed

CPU's these days have a TDP (Thermal Dissipation of Power) at about **65W** for the mid end and go up to 150W for some high end processors (Current Quad cores). These ratings, keep in mind are absolutely high end readings and the processor may or may not consume this much power at load.

If however you do Over Clock the system, the maximum TDP increases, heres how to calculate the TDP of a OC'd system.

Overclocked TDP = Current TDP * %age of overclock + Current TDP * %age increase in Vcore

Example : Consider a E4300 rated at 65W running at 1.8GHz stock with default Vcore at 1.25V

When OC'd to say 3Ghz at Vcore 1.4V thats

%age of Overclock = (Current OC Speed / Default Stock Speed)

%age increase in Vcore = 1 - (Current Vcore / Default Vcore)

That means :

%age Overclock = 1.66

%age Vcore = 0.12

Which means :

Overclocked TDP for this example becomes = $65 * 1.66 + 65 * 0.12 = 115.7W$

You can similarly calculate the Power requirements for any other processor by knowing these simple variables (hint : Google for the TDP of your processor)

2. GPU

This is a tricky part, basically I'll list the TDP of some of the common GPU's bought today and the Overclocked TDP can be calculated in a similar manner as above. For TDP of other GPU's use Google. Always remember Google is your friend.

Disclaimer : These rating are approximate

nVidia :

7900GS : 110W
8500GT : 40W
8600GT : 75W
8600GTS : 110W
8800GTS : 150W
8800GTX : 180W

AMD/ATI :

HD 2900XT : 200W

If using more then 1 card using SLI/Crossfire Technology, add the TDP of both the cards.

If some one knows TDP of more GPU's mention in the comments section and I'll update the article accordingly :)

3. Motherboard

This is a tricky part, couldn't find information on the TDP regarding the motherboards and then I read this :

http://firingsquad.com/hardware/intel_quad-core_xeon_5365_v8/page2.asp

[Quote]You're looking at about 75W for the motherboard, case fans, keyboard/mouse, USB hubs, etc.
[/Quote]

Since I am covering case fans later onwards, for a motherboard add **60W** of Power.

4. HDD's

For each HDD you have connected to the system add **15W** at load.

5. DVD RW's

For each DVD RW you have connected to the system add **20W** at load.

6. Fans

For each high speed high performance **120mm** fan add **10W**

For each high speed high performance **80/92mm** fan add **5W**

For other fans connected the system add 2W

High Speed High Performance fans also include fans installed with the SMPS, CPU and GPU.

7. Other LED's etc

For these add some **15W** in general.

Final Words :

Calculated the total supply, now increase the same by 20% for PSU degradation over time and 15% for future upgrades (or calculate the future power upgrades manually).

The final wattage is what the PSU you get should have at the bare minimum for a stable, smooth and tension free operation of your system.

Other part of the series coming in a few days.

Comments Welcome.

References :

http://firingsquad.com/guides/power_supply/

<http://www.extreme.outervision.com/psucalculator.jsp>

http://firingsquad.com/hardware/intel_quad-core_xeon_5365_v8/page2.asp