

Monday, October 8, 2007

## Why is my power supply input only rated from 100-240VAC?

Most power supplies have a rating label that looks something like this:



However, a close look at the power supply's datasheet will usually show the absolute AC input voltage range, from minimum to maximum. This is usually 90-264VAC, or occasionally 85-264VAC if the power supply has been designed for Japanese use.

Japan uses the lowest AC mains voltage, which is 100VAC nominal; however, short duration AC line droops or brown-out conditions often mandate a rating down to 85VAC. The UK is among the countries that use the highest AC mains, with a nominal rating of 240VAC.

The safety certification bodies (UL, CSA, TUV, etc.) mandate that a rating of 100-240VAC be listed on the power supply's label. However, they factor in a +/-10% tolerance for the power generation and transmission utilities. -10% of 100VAC is 90VAC, and +10% of 240VAC is 264VAC. All safety testing is performed at the high and low limits as listed on the power supply's datasheet.

So, if the power supply label states 100-240VAC, it can usually operate over a wider AC operating input range. However, always check with the manufacturer's datasheet to confirm this. Continuous operation of the power supply over the datasheet's specified AC input range will not normally cause any problems. In some cases, however, the maximum output power (total watts) of the power supply may need to be derated if the supply is operating off an input voltage that is on the low-end of the specified range. Always check the power supply's datasheet for the specified minimum AC input voltage with various output load levels. Deratings may also apply depending upon the power supply's operating ambient temperatures.

Should a label state 100/240VAC (note the slash) it "may" indicate that there is a voltage select switch or jumper that is required to be set for the correct operating input voltage range. Newer products tend to not have an AC select switch or jumper.

Worldwide, the AC mains power has a nominal frequency of either 50 or 60 Hz (cycles per second). However, these frequencies are subject to variations by the power generators in different countries (especially third world) and so the typical AC frequency range for power supplies is 47-63Hz.

Posted by [Power Guy](#)