

## Application Guidelines for Power Supplies

### AN15-002 Fan speed control in the CP platform

There are three processors inside the power supplies. In the rectifier, a primary processor controls the Boost section, and a secondary DSP controls the DC-DC converter associated with the main output. The third processor is the I<sup>2</sup>C micro controller whose primary responsibility is obtaining data from the other processors and communicating this data as requested across the I<sup>2</sup>C busses. (Note that RS485 protocol revisions of the power supplies communicate via the secondary DSP and not the I<sup>2</sup>C micro controller)

The speed of the internal fan is controlled by the secondary processor (DSP) which obtains data from a number of sources including the primary processor. The processors on the primary and the secondary side monitor various thermal sensors inside the rectifier. These thermal sensors are mounted on heatsinks associated with components of the primary PFC, primary side DC-DC, secondary side DC-DC, and the area around the output or'ing section. The secondary processor (DSP) will regulate the speed of the fan to ensure that each of these sensors operate below a pre-determined threshold.

How hot these monitored heatsinks are allowed to be is derived empirically from thermal measurements obtained of many other, non-monitored, components around these heatsinks. These components are

exposed to different operating conditions, such as variations in output power, operating temperature or input voltage.

The fan is allowed to stop spinning if the internal thermal profile of all sensors is below the thresholds and if operating conditions do not expose some components to high temperatures. The profile is built into the fan control section of the DSP.

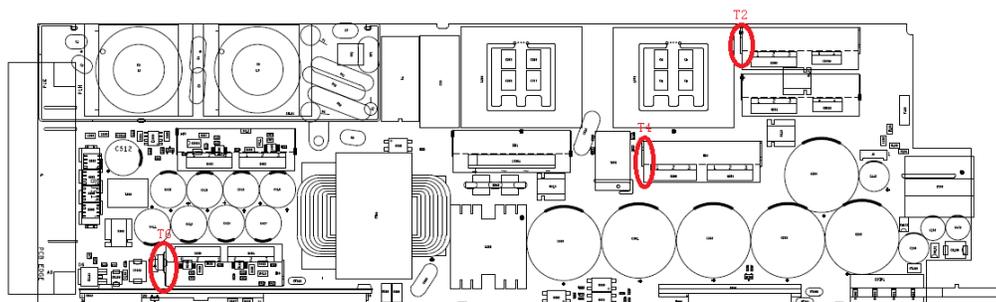
Since fan speed control is proportional to a number of variables such as input voltage, output power and operating temperature, it isn't practical to quantify how fast the fan spins based on only a single parameter such as delivered output power. But it is safe to say that fan speed is proportional to delivered output power.

The minimum fan speed can be controlled by the customer through the communications protocol. The rectifier will increase the speed of the fan above the customer controlled setting whenever internal controls determine that a higher speed is required to keep temperatures below the pre-determined thresholds. The customer, however, cannot reduce the speed of the fan below what the internal controls deem necessary. Although the speed of the fan may increase above the customer controlled setting, the speed of the fan will not fall below the customer controlled setting.



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Typical location of the thermal sensors in rectifiers

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