Thermal Characterization of the cPCI500DC Power Supply

The cPCI500DC is comprised of an array of high-density DC-DC converters using our patented technology to achieve unique performance in the 6Ux4HP form factor. While the datasheet delineates the capabilities at 400lfm of airflow at 50°C, it is recognized that some applications may not support these requirements. The robust design of the cPCI500DC will permit operation under extraordinary environmental conditions with certain limitations on the outputs.

Specifically, each of the constituent converters has specific maximum current and power ratings. However, because of the thermal interaction of these converters within the assembly and their thermally-dependent electrical characteristics, the maximum current and power ratings are not always simultaneously achievable when the unit is operated outside of the design limits. Thermal characterization of the cPCI500DC is therefore a complex issue involving several variables even when limiting the analysis to first-order effects. The fundamental factors are airflow, ambient air temperature, input voltage, power loading, and the output load profile.

Notwithstanding the foregoing, ***there are many load profiles under which the cPCI500DC will operate within specification at reduced airflow and/or increased ambient temperature.*** The cPCI500DC datasheet provides the maximum output current ratings with 400lfm of airflow at 50°C, and these maxima are achievable under all combinations of input line and output load profile as long as the output power does not exceed 500W. However, the permutations of load conditions and combinations of environmental factors is so numerous as to preclude us from exhaustive characterization. Thus, in this application note, we present four additional data points that may prove helpful to you in understanding the extraordinary capabilities of this high-performance product. These data are presented as typical; ultimately, characterization in your application will require testing of the cPCI500DC to determine performance.

Airflow	Ambient	V_{in}	P_{out}	I_5	$I_{3.3}$	I_{+12}	I_{-12}
400 lfm	**60°C**	36-72V	500W	55A	30A	8.75A	1.75A
400 lfm	**60°C**	36-72V	500W	52A	30A	10A	1.75A
250 lfm	**55°C**	36-72V	500W	55A	30A	8.75A	1.75A
250 lfm	**55°C**	36-72V	500W	52A	30A	10A	1.75A