Digital PFC Controllers Battle Analog Chips On Performance And Price

Cirrus Logic's CS1500 and CS1600 PFC controllers are being introduced as the industry's first digital power factor correction (PFC) controller ICs that surpass analog PFCs on performance and price. According to the company, these chip offer power supply and lighting ballast system designers improved performance and simplified design compared to legacy analog PFC controllers. Both ICs are priced on par with analog PFCs, while also lowering the overall bill of materials by up to $0.25.

The CS1500 and CS1600 are digitally controlled, discontinuous conduction mode (DCM), active PFC controllers intended for use in power supplies rated up to 300 W. The CS1500 is designed to address power supplies such as laptop adapters, and supplies used in digital TVs and PC power. The CS1600 targets electronic lighting ballasts.

These devices feature the company's EXL Core architecture, which incorporates 53 patented and patent-pending digital algorithm technologies (Fig. 1). Through its digital noise-shaping technology (i.e. spread-spectrum techniques), both the CS1500 and CS1600 enable reduced-sized EMI filters. In addition, the new controllers reduce the external component count by more than 30 percent when compared with conventional designs (Fig. 3). Additionally, these digital ICs improve energy efficiency across all load conditions, particularly under light-load conditions (Table 1).

"We're bringing disruptive digital technology to applications that are currently dominated by analog solutions," said Jason Rhode, president and chief executive officer, Cirrus Logic. "Until today, no one has been able to develop a digital PFC controller that offers both performance improvements and cost savings compared to analog-based PFCs."

The CS1500/1600 offer several forms of protection including undervoltage lockout, and overvoltage, overtemperature, and overload protection. These devices consume less than 200 mW in standby mode. Available in 8-pin SOIC packages, the CS1500 and CS1600 are priced at $0.30 each in quantities of 1,000,000.

Fig .1 The CS1500 and CS1600 PFC controllers are based on the company's EXL Core architecture, a digital technology platform.

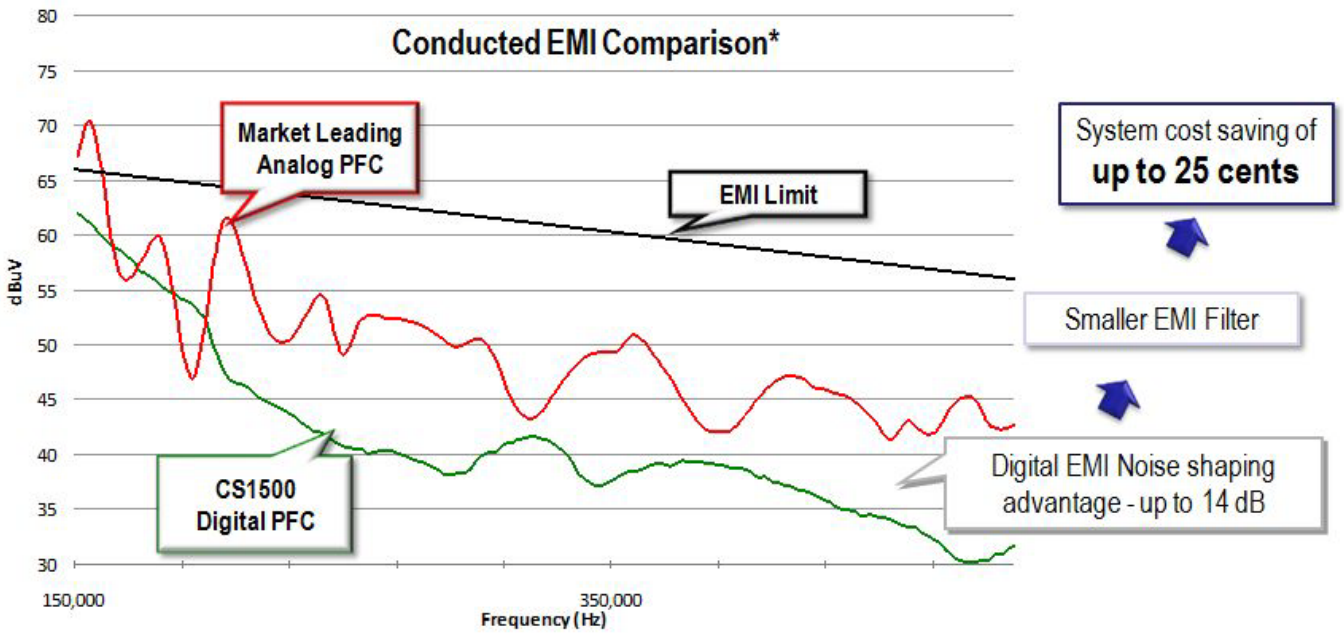

*Fig 2. The digital PFC controllers use spread-spectrum techniques to reduce EMI, allowing use of smaller EMI filters in PFC stages. (*Comparison is to the current market-leading solution using their own reference design.)*

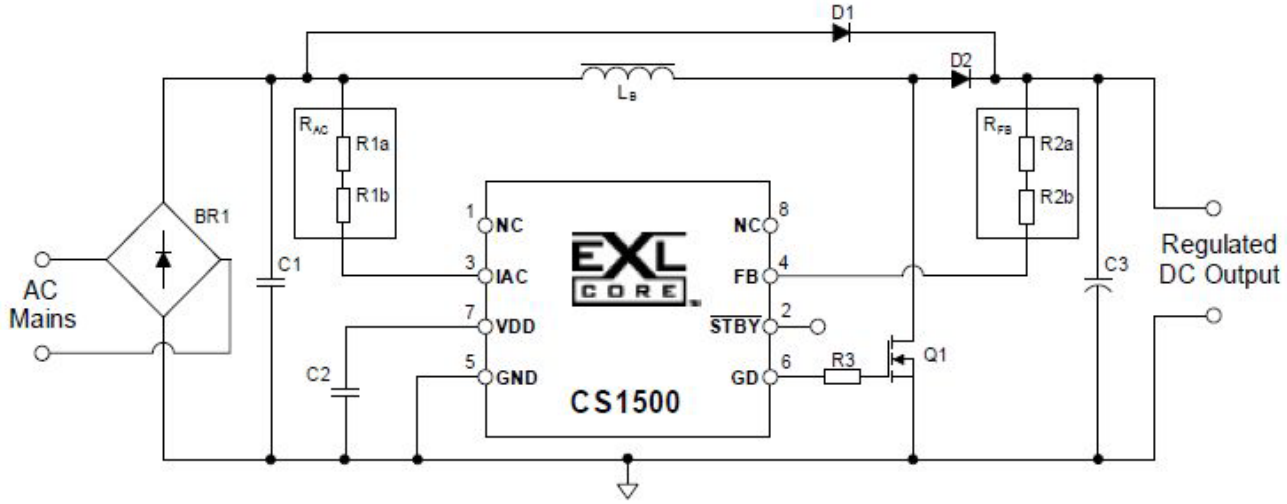

Fig. 3. Digital control eliminates many of the passive components that would typically be required in a conventional PFC circuit.

Table. Efficiency of Cirrus Logic's digital PFC controller solution versus analog solution.

	Efficiency Across the Load Range		
	At 10% load	At 50% load	At 100% load
Cirrus Logic's digital PFC solution	93%	94%	95%
Competing Analog* Solution	88%	92%	95%

*According to Cirrus logic, this solution represents market-leading performance for analog-based designs.