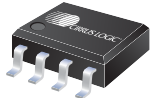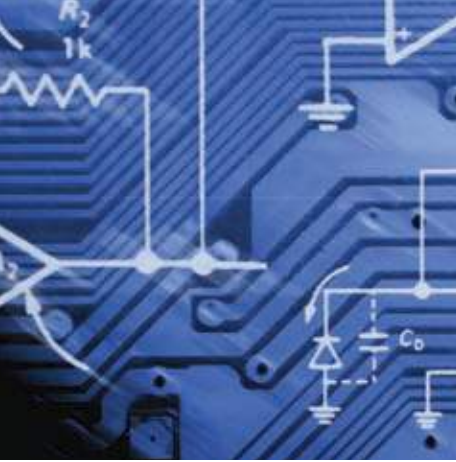# CS1600 Digital PFC Controller

POWER FACTOR CORRECTION IC FOR LIGHTING BALLASTS

CS1600 8-PIN SOIC

(actual size: 5 mm x 5 mm)

FLUORESCENT BALLASTS

LED BALLASTS

CIRRUS LOGIC, INC.

2901 Via Fortuna
Austin, Texas 78746
United States
T +1-512-851-4000
Toll-Free +1-800-888-5016
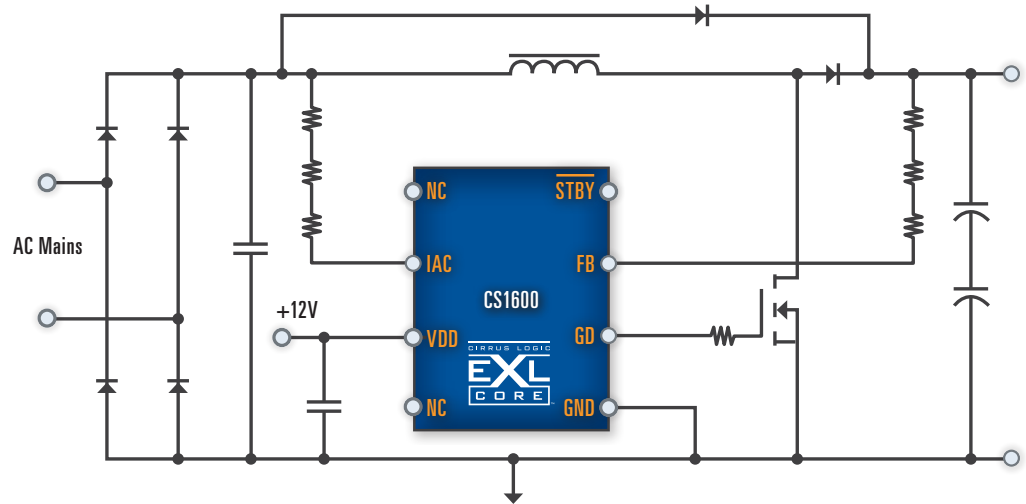
SALES SUPPORT

North America +1 800-625-4084
Asia Pacific +852 2376-0801
Japan +81 (3) 5226-7757
Europe/UK +44 (90) 1628-891-300

LEARN MORE AT
www.cirrus.com

OVERVIEW

The CS1600 is a high-performance Variable Frequency Discontinuous Mode, active digital power factor correction (PFC) controller. It features Cirrus Logic's EXL Core™ technology that brings digital energy control innovation which elevates performance and solves system design challenges in electronic lighting ballasts.

The unique digital architecture of the CS1600 enables reduced-size EMI filters and eliminates the need for numerous passive components, delivering the lowest PFC system costs available.

Variable on-time / variable frequency algorithm is used in achieving close to unity power factor and spreading the EMI frequency spectrum, thus reducing the conducted EMI filtering requirements. The feedback loop is closed through an integrated compensation network within the IC, eliminating the need for additional external components. Protection features (such as overvoltage, overcurrent, overpower, open and short circuit protection, over-temperature, and brownout) help protect the device during abnormal transient conditions.

FEATURES

- Lowest PFC System Cost for Electronic Ballasts
- EMI Signature Reduction from Digital Noise Shaping
- High System Efficiency with Variable Frequency Discontinuous Conduction Mode
- Integrated Feedback Compensation
- PFC FET Disabled Near Input Zero Voltage Crossing

EXL CORE TECHNOLOGY

The EXL Core is a digital technology platform at the heart of Cirrus Logic's commitment to develop innovative solutions that help our customers cost effectively create smarter, greener energy products.

DEVELOPMENT BOARD CDB1600

REFERENCE DESIGN CRD1600

ADDITIONAL FEATURES

- Elimination of External Current Sense Resistor
- Overvoltage Protection with Hysteresis
- Overpower Protection with Shutdown
- UVLO with Wide Hysteresis
- Thermal Shutdown with Hysteresis

DEVELOPMENT BOARD CDB1600

CDB1600 is a PFC-only development board featuring Cirrus Logic's CS1600 Digital PFC Controller. Test points, an inductor current measurement loop, and a signal injection path for stability analysis are included to improve usability and design optimization.

- Output Power: 120 W
- Input Voltage: 108-305 VAC
- Output Voltage: 460 V
- Power Factor: >0.98
- THD: <5%

REFERENCE DESIGN CRD1600

CRD1600 is a complete ballast reference design featuring Cirrus Logic's CS1600 Digital PFC Controller. The design is based on a slim-line ballast form factor and is optimized for use with 2, T5 lamps.

- Output Power: 120 W
- Input Voltage: 108-305 VAC
- Output Voltage: 460 V
- Size (LxWxH): 349 x 25 x 25 mm
- Power Factor: >0.98
- THD: <5%

The CS1600 uses a proprietary digital control algorithm to shape conducted EMI emissions, resulting in significantly reduced EMI filter requirements. Digital EMI Noise Shaping consists of three major components:

- Variable switching frequency
  - The average switching frequency is varied with respect to the line voltage spreading energy over a wide frequency band.
  - The switching frequency is highest at the peak of the input voltage which minimizes peak currents

- Digital Spread Spectrum
  - Shapes colored noise eliminating EMI noise spikes

- Peak current amplitude spreading provides additional spreading and further reduces EMI peaks
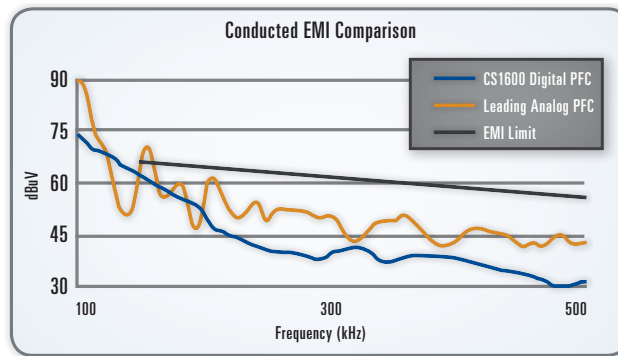
Part Number	*Control Method	Max f_{SW} [kHz]	Frequency Spreading	Peak Current Spreading	IC Supply Current [mA]	V_{DD} Range [V]	T_J Op. Range [°C]	Gate Driver (Source/Sink) [Ω]	Internal Feedback Compensation	Package
CS1600	*VF-DCM	70	√	√	1.9	7.9 - 17.0	-40 to +125	9 / 6	√	SOIC-8

*Variable Frequency Discontinuous Conduction Mode