

STNRGPF01

Shift into high gear with digital power



Digital controller specifically designed for interleaved CCM boost power factor corrector (PFC) topologies ideal for high power applications

In high-power applications interleaved CCM PFC topologies are mandatory to handle such power levels with reasonable magnetic volume and current split.

Moreover, the quest for higher efficiency, connectivity and configuration options encourages the use of expensive and complex DSP solutions. Fully configurable through an intuitive GUI, ST's unique STNRGPF01 digital controller provides the same level of performance as DSPs but with a much lower level of complexity and does not require any firmware implementation.

KEY FEATURES & BENEFITS

- Digital controller fully configurable through GUI for fast and easy design, does not require writing any firmware
- Up to 3-channel interleaved boost PFC
- Ideal for wide power range above 1 kW
- Reduced EMI filter and inductor volume
- Reduced output capacitor RMS current
- Flexible working frequency up to 300 kHz to drive both MOSFETs and IGBTs
- Configurable phase shedding for wide load range high efficiency conversion
- Soft start-up to reduce electrical stress and to manage inrush current
PFC Soft Power-On

- On-chip UART/ I2C digital interfaces for convenient connectivity
- Ideal for outdoor applications with -40 to +105 °C operating range

KEY APPLICATIONS

SMPS above 1 kW in industrial equipment and home appliances including:

- Welding equipment, motors, pumps, uninterruptible power supplies (UPS), battery chargers, power supplies
- Air conditioners, refrigerators, cookers, washers and dryers

POWERING THE FUTURE

Rugged enough for high-end industrial SMPSs as well as high-power home appliances, the STNRGPF01 digital controller features an interleaved CCM boost PFC topology. The technique splits the PFC management into two or more parallel channels depending on the load condition, therefore ensuring the highest level of efficiency at any load. Compared to traditional single-stage PFC controllers, the EMI filter and the inductor dimension can be reduced. In addition, switch power management is improved and the RMS current of the output capacitor is reduced. Moreover, the device contains all the control

functions to implement a high efficiency-mode power supply with sinusoidal line current consumption, working in continuous conduction mode (CCM) at a fixed frequency with average current mode control. In particular, the STNRGPF01 implements mixed analog and digital signal control, offering the advantages of a very high-end digital solution: the inner current loop is performed in hardware realizing an analog Proportional-Integral (PI) compensator, ensuring regulation cycle by cycle. The outer voltage loop is performed by a digital PI controller with fast dynamic response. While providing the advantages of very

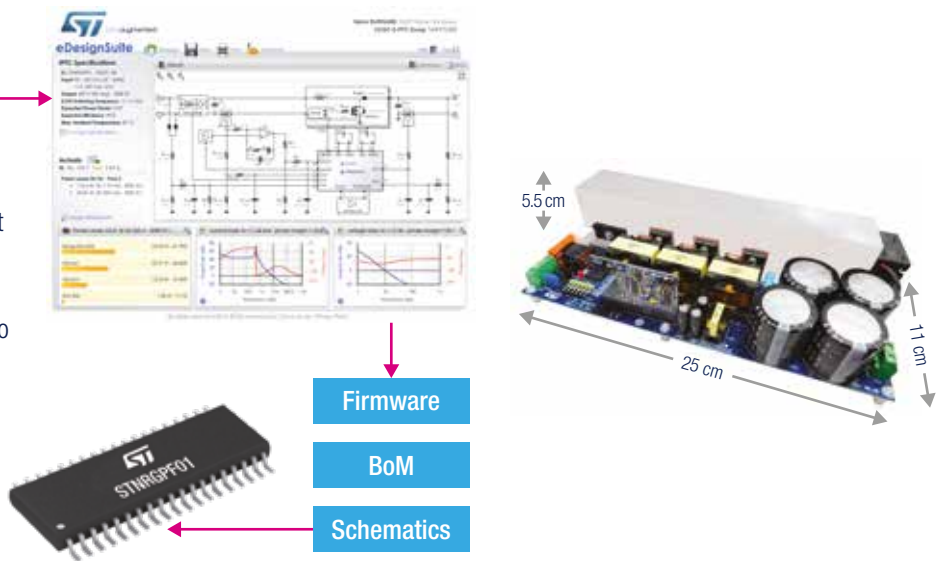
high-end digital solution, the STNRGPF01 is simple to configure using the dedicated GUI (eDesignSuite). The user enters the converter specs and runs the configurator. eDesignSuite outputs the schematics, BoM, and customized binary code that can be loaded into the IC.

Unlike complex DSPs, the developer is not required to write any lines of firmware, to know the device registry and memory map, to handle interrupt generation and manage priorities, nor to implement any function. He can focus on the application and enjoy all the power and flexibility of a fully configurable digital controller.

FROM IDEAS TO PROTOTYPES



- Developers can access E-Design suite at www.st.com/edesign and enter the project specs
- E-Design guide provides the schematic, BoM, and the binary code to be loaded into the STNRGPF01
- The STNRGPF01 is immediately ready to run the custom application, just like an analog device



DEVICE SUMMARY

| Order code | Package | Packing | Description |
|-----------------------|---------|--------------------|--|
| STNRGPF01/STNRGPF01TR | TSSOP38 | Tube/Tape and reel | Digital controller designed specifically for interleaved CCM boost PFC topologies and intended to be used in high-power applications |

EVALUATION BOARD

| Order code | Description |
|-----------------|---|
| STEVAL-IPFC01V1 | 3 kW three-channel interleaved PFC based on STNRGPF01 |

