STEVAL-IPFC01V1
# 3 kW three-channel interleaved PFC

Boost PFC efficiency and power density with STNRGPF01 digital controller and MDmesh M2 Power MOSFETs

The STEVAL-IPFC01V1 PFC reference design operates up to three interleaved boost converters, enabling use of smaller and lower-profile components rather than a single channel topology.
The converter works in CCM at a fixed frequency with average current mode control and implements a semi-digital (mixed signal analog/digital) control scheme, making possible a cycle-by-cycle current regulation at high switching frequency.

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


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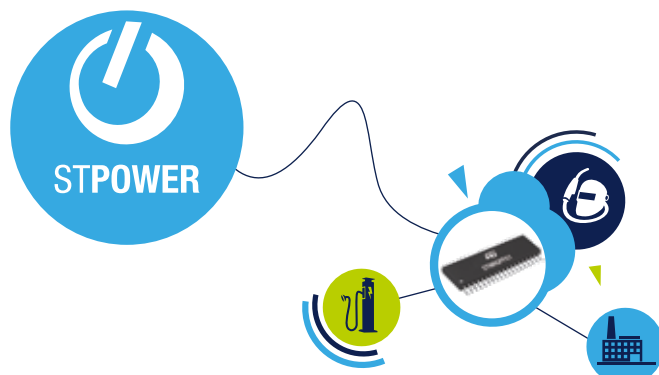
A visual dedicated software tool eDesignSuite allows the user for customize the PFC configuration and all the relevant electrical components. As a result, the tool will automatically generate a full schematic, a complete list of material and the final binary object code (FW) to be downloaded to the STNRGPF01 core device.

In terms of performances, a phase shedding control strategy results in a flat efficiency curve with peak value close to 98%, ideal to meet the most stringent requirement of new standards and regulations. At full power the THD is in the range of 3% while the PF is higher than 0.99.

- Developers can access eDesignSuite at www.st.com/edesign and enter the project specs

- eDesignSuite generates the schematic, the 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

Schematics

BoM

Firmware
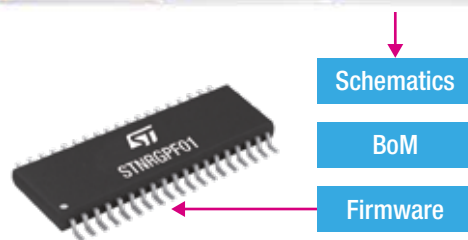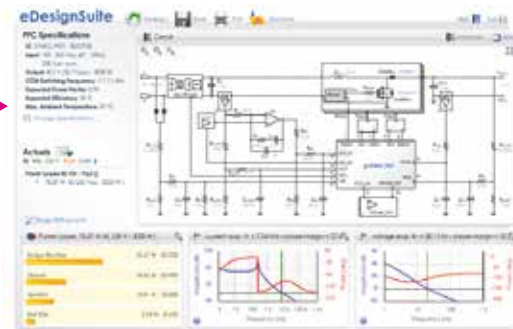
KEY FEATURES

- Input voltage range: 90 to 265 VAC
- Pout = 3 kW @ Vin = 230 Vac
- Vout = 400 V
- Peak efficiency: >97.5%
- PF > 0.98 @ 20% load
- THD < 5% @ 20% load
- Semi-digital average current mode control, CCM fixed frequency operation
- Switching frequency: 111 kHz per channel
- Cycle-by-cycle regulation (analog current control loop)
- Input voltage feed forward
- Load feed forward
- Phase shedding
- Fully configurable through GUI for fast and easy design, does not require writing any firmware

KEY PRODUCTS

- STNRGPF01 (Digital controller for PFC)
- PM8834 (Dual low side gate driver)
- ALTAIR05-800 (Off-line all-primary-sensing switching regulator)
- STW40N60M2 (MDmesh M2 Power MOSFET)
- STPSC1206 (Schottky silicon carbide diode)
- TSV911 (High speed Op-Amp)
- LMV358 (Rail-to-rail Op-Amp)

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