Firmware for the 3 kW telecom rectifier based on the STM32G474RBT6 digital power MCU

Features

- Maximum 184 ps PWM resolution
- Simultaneous voltage/current sampling by multiple ADCs (up to five)
- Critical protections by faster comparators (up to seven)
- Input/output overcurrent protections
- Undervoltage/overvoltage protections
- On-line coefficient tuning via UART
- CPU effort reduction by hardware filter mathematical accelerator (FMAC)
- Blanking and soft-start scheme of PWM modulation for current spike issues at AC zero crossing (PFC)
- Adaptive algorithm for synchronous rectification (SR) control to improve overall efficiency (LLC)

Description

The STSW-3KWTLCP firmware package demonstrates the capability of the STDES-3KWTLCP telecom rectifier reference design to meet high-performance requirements.

A digital solution by the STM32G474RBT6 digital power MCU is used for both PFC and DC-DC stages.

The STSW-3KWTLCP allows controlling the PFC stage by using a bridgeless totem-pole topology. It also controls the DC-DC stage by using a full bridge LLC topology.

Thanks to the full digitalization and to dedicated control algorithms, the STDES-3KWTLCP achieves a low THD distortion, which is less than 5% at full load, a reliable operation with dynamic load conditions, and a high overall efficiency.

Product summary	
Firmware for the STDES-3KWTLCP 3 kW telecom rectifier	STSW-3KWTLCP
3 kW telecom rectifier reference design based on the STM32G474RBT6 digital power MCU	STDES-3KWTLCP
Mainstream Arm® Cortex®-M4 MCU 170 MHz with 128 Kbytes of flash memory	STM32G474RBT6
Applications	Server & Telecom Power / On Board Charger (OBC) / EV Charging

DB4637 - Rev 1 - January 2022
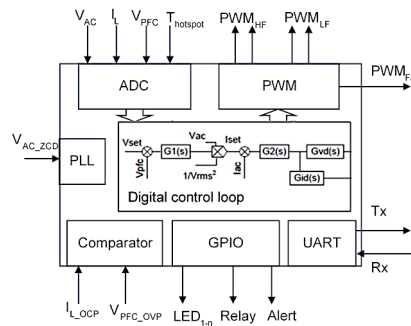For further information contact your local STMicroelectronics sales office.

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1 Software overview

The PFC power stage is digitally controlled by ST MCU - STM32G474RBT6 used at primary side.
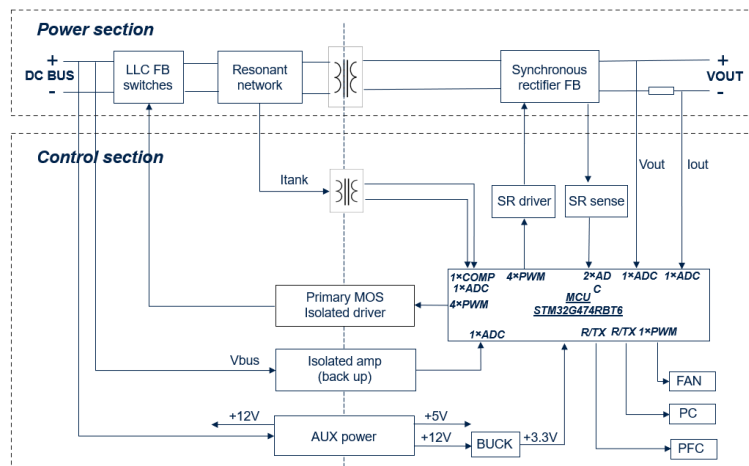
Figure 1. System architecture of totem pole PFC
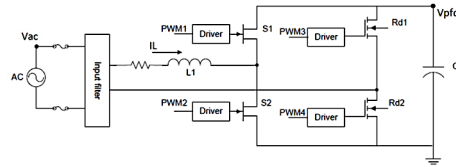
Figure 2. Functional block in MCU
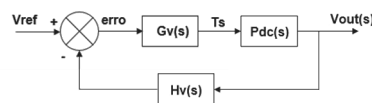

The LLC power stage is digitally controlled by ST MCU - STM32G474RBT6 used at secondary side.

Figure 3. System architecture of full bridge LLC

Figure 4. Control architecture for LLC

Revision history

Table 1. Document revision history

Date	Revision	Changes
13-Jan-2022	1	Initial release.

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