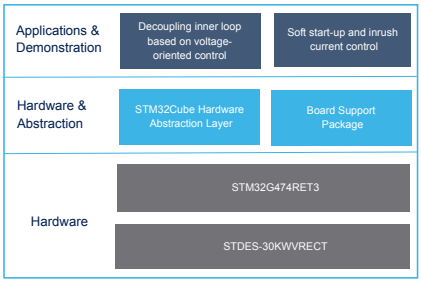
STSW-30KWVRECT

Data brief

Firmware for the 30 kW Vienna PFC rectifier based on the STM32G474RE digital power MCU



Features

- Maximum 184 ps PWM resolution
- Simultaneous voltage/current sampling by multiple ADCs (up to 5)
- Critical protections by faster comparators (up to 7)
- Input/output overcurrent protections
- Undervoltage/overvoltage protections
- Soft startup and inrush current control
- Software PLL
- Decoupling inner loop based on voltage-oriented control
- Neutral point potential balance control with zero sequence voltage injection

Product summary	
Firmware for the 30 kW Vienna PFC rectifier based on the STM32G474RE digital power MCU	STSW-30KWVRECT
30 kW Vienna PFC rectifier reference design with digital control	STDES-30KWVRECT
Mainstream Arm Cortex-M4 MCU 170 MHz with 512 Kbytes of flash memory	STM32G474RET3
650 V, 18 mOhm typ., 119 A silicon carbide power MOSFET in an HiP247-4 package	SCTWA90N65G2V-4
1200 V, 40 A high surge silicon carbide power Schottky diode	STPSC40H12CWL
Galvanically isolated 4 A single gate driver for SiC MOSFETs	STGAP2SICS
Applications	EV Charging

Description

The STSW-30KWVRECT firmware package demonstrates the capability of the STDES-30KWVRECT Vienna PFC rectifier reference design to meet high-performance requirements.

A digital solution by the STM32G474RE digital power MCU is used for the Vienna PFC.

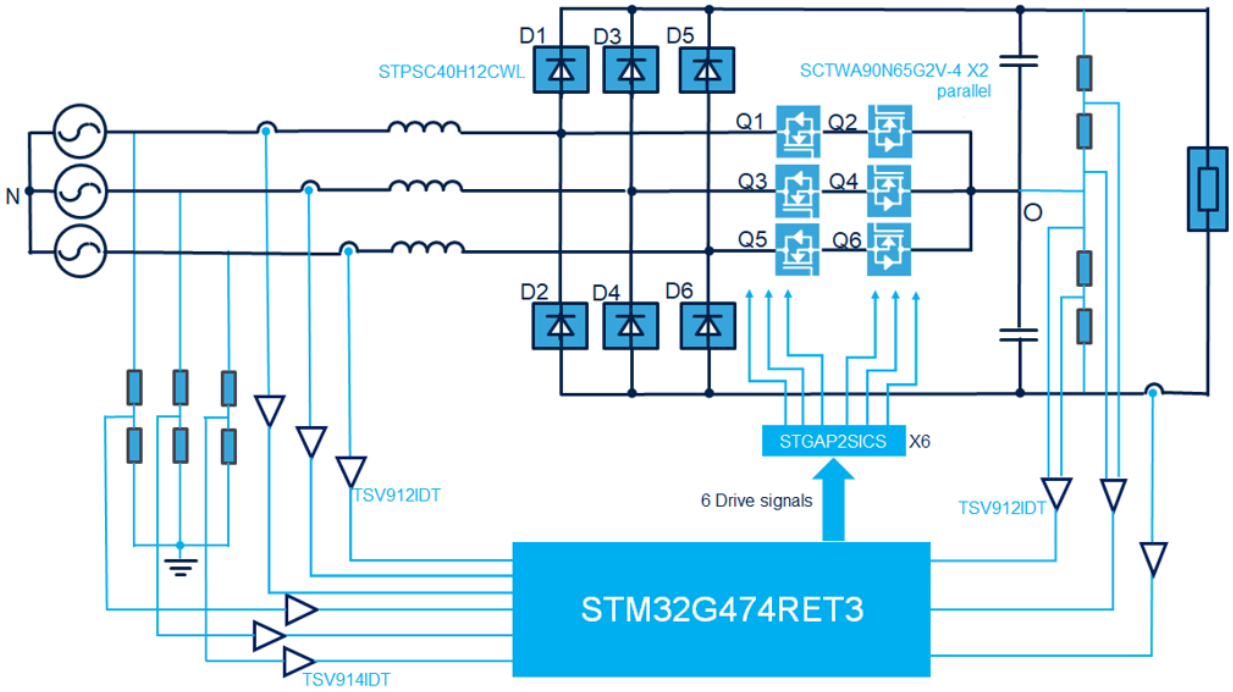
The STDES-30KWVRECT reference design topology is mostly used for industrial and electric vehicle DC fast charging applications.

Thanks to the full digitalization and to dedicated control algorithms, the STDES-30KWVRECT achieves a low THD distortion, which is less than 5% at full load, and a high overall efficiency and power factor.

1 Software overview

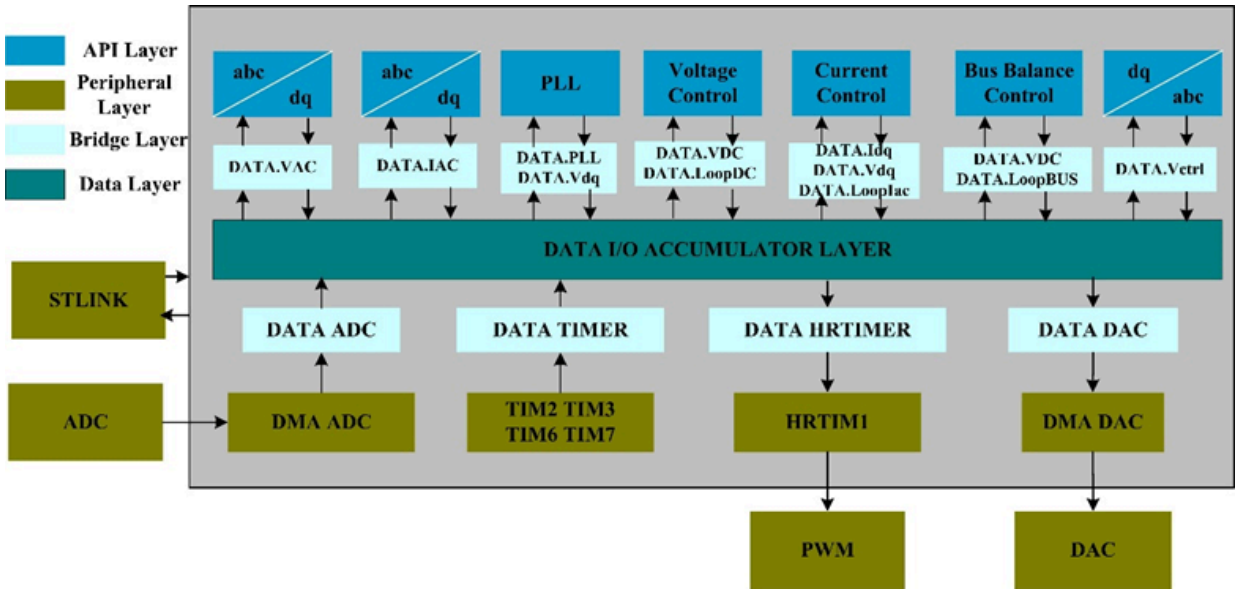
The three-phase Vienna PFC uses the digital control with the ST STM32G474RET3 MCU.

Figure 1. System architecture of the three-phase Vienna PFC



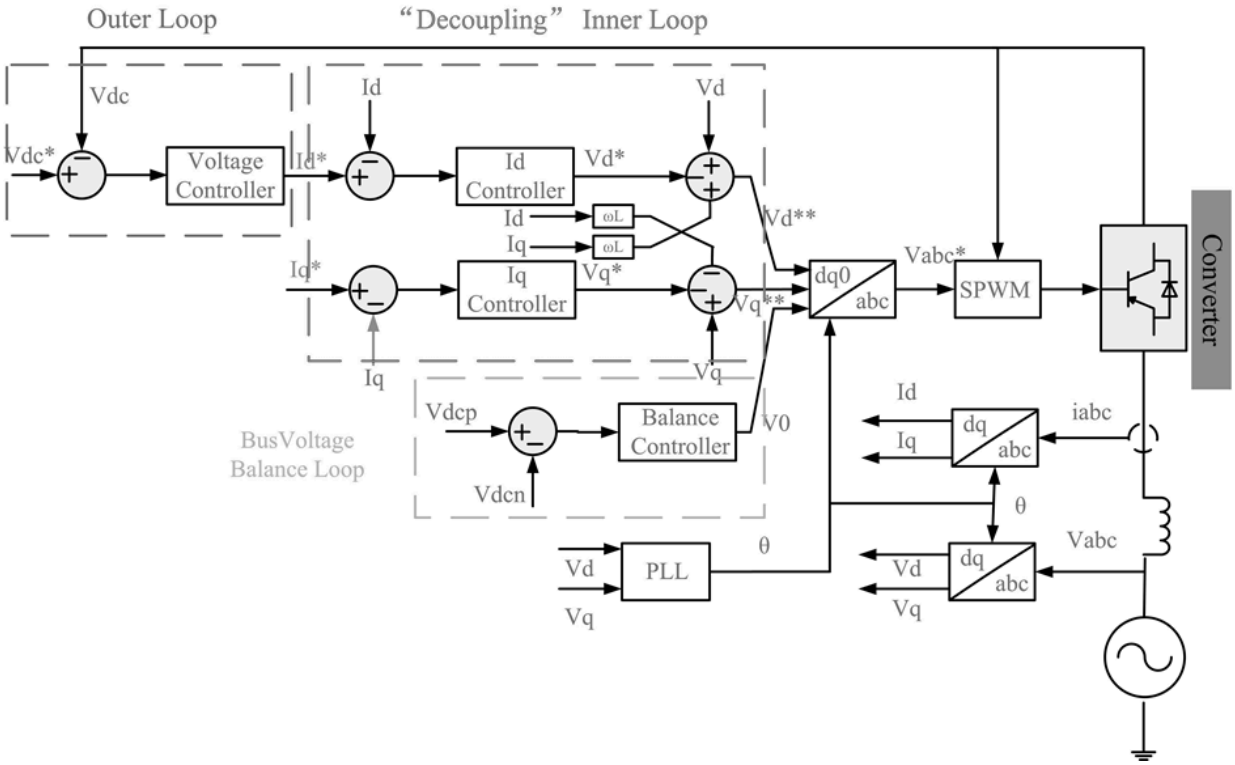
Based on this system architecture, the following figure shows the control block diagram.

Figure 2. Functional block in the MCU



The control strategy adopted for the Vienna PFC is a decoupling inner loop based on voltage-oriented control in a dq-coordinate system.

Figure 3. **Control strategy for the Vienna PFC**



Revision history

Table 1. **Document revision history**

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