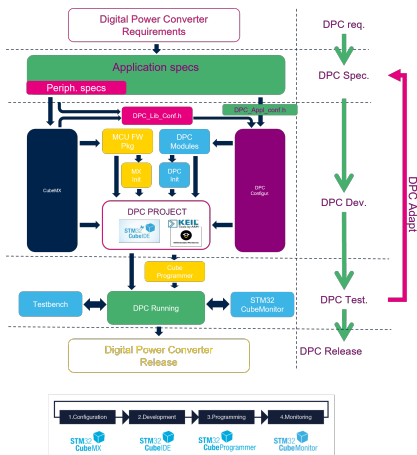


# Firmware for three-phase Vienna rectifier with full digital control for power factor correction



## Features

- Voltage-oriented control (VOC) algorithm
- Based on the [STM32G474RET3](#) MCU
- Digital solution with advanced analog peripherals (comparators, op-amps, ADCs, and DACs)
- High-resolution timer (HRTIM)
- Hardware math accelerator (CORDIC, FMAC)
- AC to DC (PFC) mode
- Power factor control (PFC)
- Output DC bus regulation
- Soft start-up and burst mode operation at light load
- Overcurrent and overvoltage protections

## Description

The [STSW-VRECTFD](#) provides a comprehensive three-phase, three-level AC-DC power conversion control on the [STM32G474RET3](#) mixed-signal MCU, which is optimized for digital power applications.

The firmware includes a sophisticated voltage-oriented control (VOC) algorithm to control AC-DC conversion.

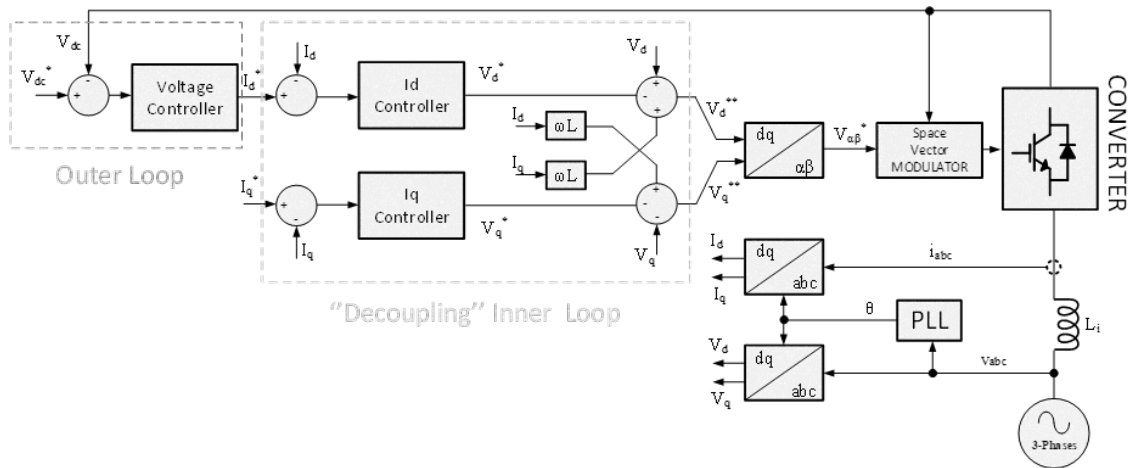
A highly dynamic current control based on the current decoupling technique performs PFC.

Product summary	
Firmware for STDES-VRECTFD	<a href="#">STSW-VRECTFD</a>
15 kW, three-level, three-phase Vienna rectifier with digital control for power factor correction	<a href="#">STDES-VRECTFD</a>
Mainstream Arm® Cortex® -M4 MCU	<a href="#">STM32G474RET3</a>
Applications	PFC Converter - Three Phase Input / Digital Power / DC Fast Charging Station

# 1 Detailed description

This application offers a solution to control a three-phase, three-level AC-DC power converter through a sophisticated voltage-oriented control algorithm in a mixed signal-integrated control platform (STM32G474RET3). The benefits of this solution are simple implementation, low-cost customization, and high performance. The following block diagram shows the main part of the voltage-oriented control embedded in the microcontroller.

Figure 1. Block diagram of the VOC: AC-DC conversion



The advanced peripherals, such as HRTIM, DMA, CORDIC, and FMAC, exploited in the VOC algorithm, allow obtaining several benefits in terms of the control performance and the power quality of the power converter.

## Revision history

**Table 1. Document revision history**

Date	Revision	Changes
21-Dec-2021	1	Initial release.

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