

Digital power supply control kit based on STM32G474RE



Features

- Control board for digital SMPS (PFC converters, HF isolating DC-DC converters, DC-AC inverters) based on the [STM32G474RE](#) microcontroller:
 - High-resolution timer (HRTIM) for D-SMPS applications
 - Filter math accelerator unit (FMAC) to perform arithmetic operations on vectors
 - Coprocessor (CORDIC) to provide hardware acceleration of trigonometric functions
- 64-pin DIN 41612 connector for D-SMPS modular approach
- STDC14 programming connector
- Opto-coupled serial communication for board-to-board communication
- RC filters for analog inputs
- Protection of the microcontroller analog lines with diode arrays
- ESD protection on SWD and COM lines
- Adapter board provided for programming and user communication (USART, CAN, SMBus)
- Supply voltage: 5 V
- Embedded 5 V/3.3 V voltage regulator
- Dedicated test points for debugging
- LED signaling for power-on, faults, errors, and general purpose
- RoHS compliant

Product summary	
Digital power supply control board based on STM32G474RE	STEVAL-DPSG474
Mainstream Arm Cortex-M4	STM32G474RET6
Applications	Power Supplies and Converters Digital Power Server & Telecom Power

Description

The [STEVAL-DPSG474](#) is a digital power supply control kit. It consists of a main board, based on the [STM32G474RE](#) microcontroller from the STM32G4 family, and an adapter board, which provides different communication interfaces and allows programming the microcontroller through a standard 20-pin JTAG connector.

The [STM32G474RE](#) microcontroller includes the high-performance Arm® Cortex® M4 32-bit RISC core operating at up to 170 MHz frequency, a floating point unit (FPU), a full set of DSP (digital signal processing) instructions, and high-speed embedded memories (512 Kbytes of flash memory and 128 Kbytes of SRAM).

The device embeds peripherals that allow the mathematical/arithmetic function acceleration (CORDIC for trigonometric functions and FMAC unit for filter functions).

The MCU offers five fast 12-bit ADCs (5 Msp), seven ultra-fast comparators, six operational amplifiers, seven DAC channels (three external and four internal), a low-power RTC, 32-bit timers, three timers dedicated to motor control, seven general-purpose 16-bit timers, one 16-bit low-power timer, and the high-resolution timer (HRTIM) with 184 ps resolution, specifically designed to drive power conversion systems.

The main board embeds a standard 64-pin DIN 41612 connector for connection with a power board. It provides all the PWM control signals, sensing networks, and protection features needed for a wide range of digital power supply applications.

An external 5 V supply voltage can supply the board either through a dedicated connector or through the main connector. The adapter board features a configurable user communication (SMBus, CAN, or RS-232) with two DB9 connectors and the appropriate transceiver ICs, a standard STDC14 14-pin connector, which provides the SWD interface for debugging and USART communication for user interface (UI), and the standard JTAG connector for programming.

The board also includes a reset button and a termination resistance between the CAN lines.

You can easily connect the [STEVAL-DPSG474](#) to another control board via opto-coupled serial communication and dedicated connectors.

Figure 1. STEVAL-DPSG474 control board: MCU circuit schematic

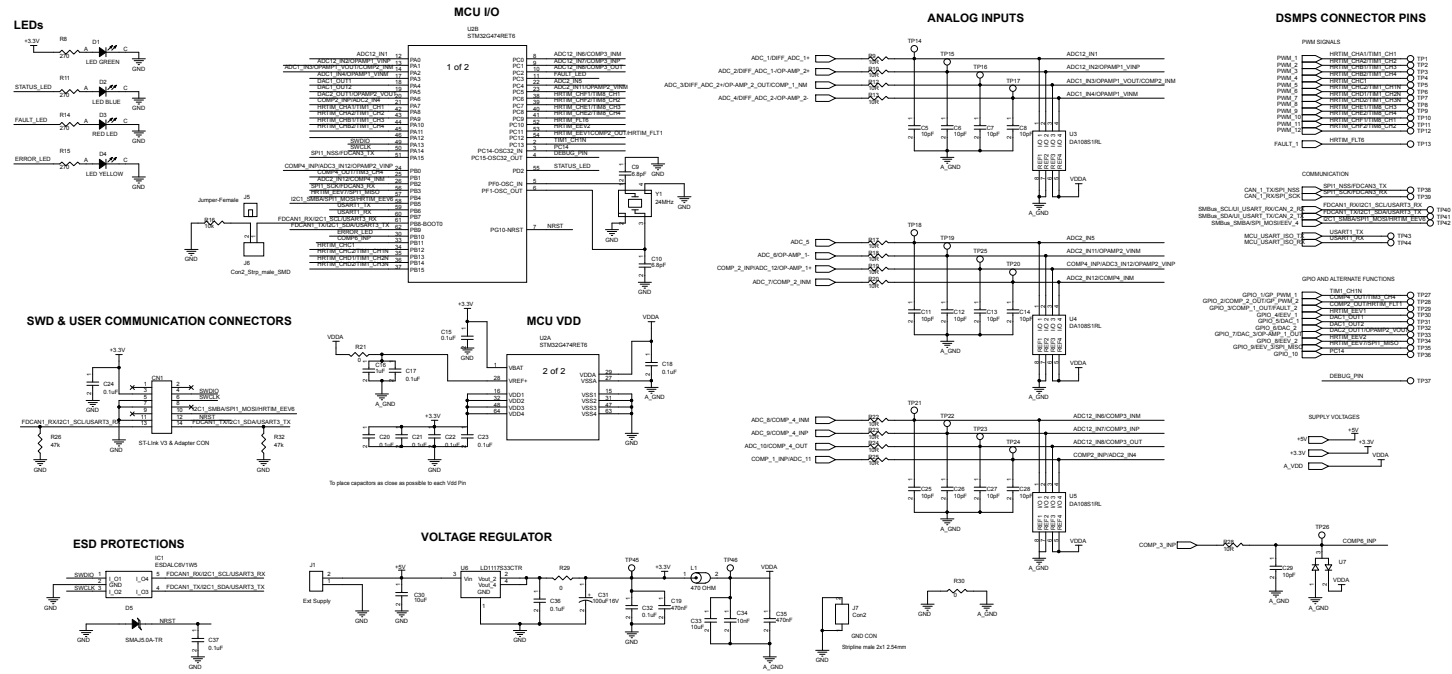


Figure 2. STEVAL-DPSG474 control board: D-SMPS connector circuit schematic

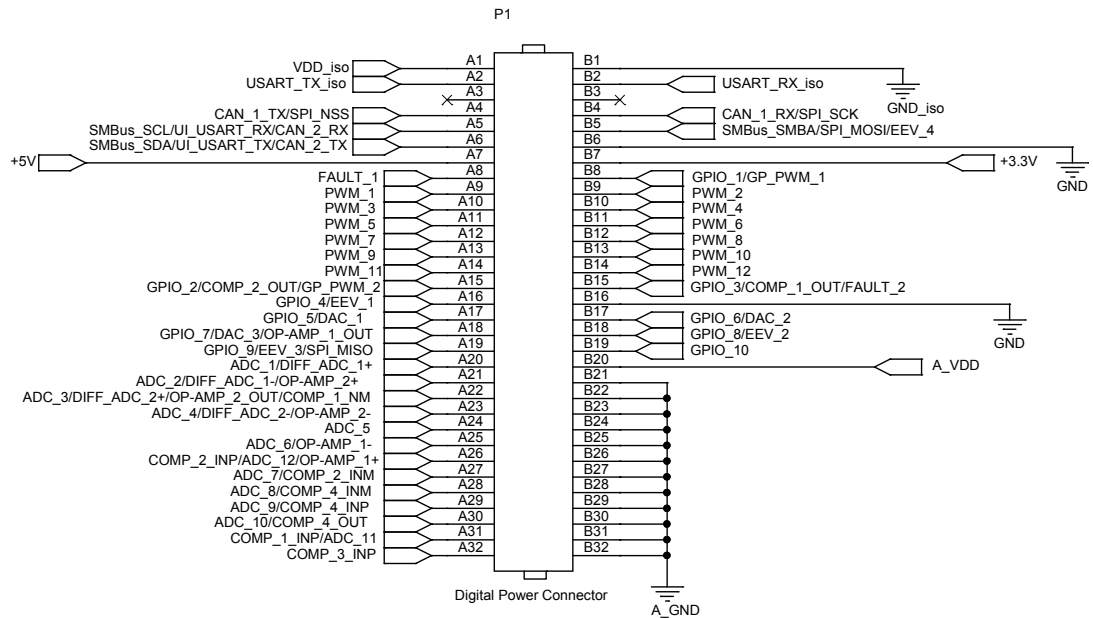
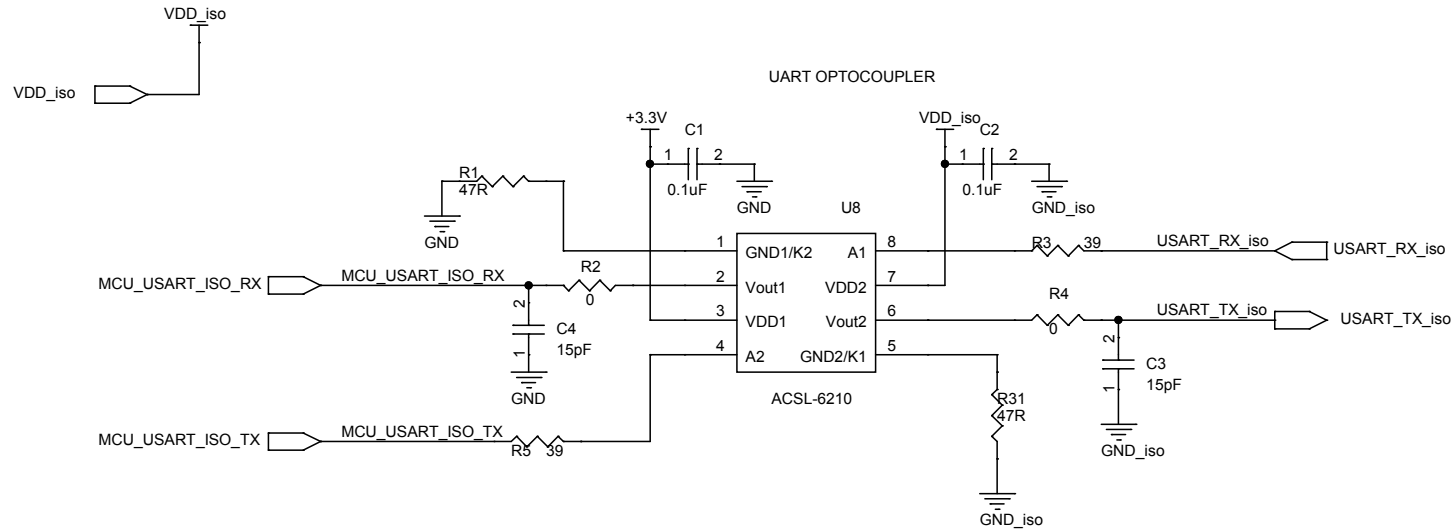
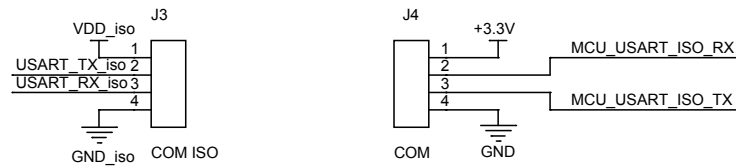


Figure 3. STEVAL-DPSG474 control board: isolated communication circuit schematic

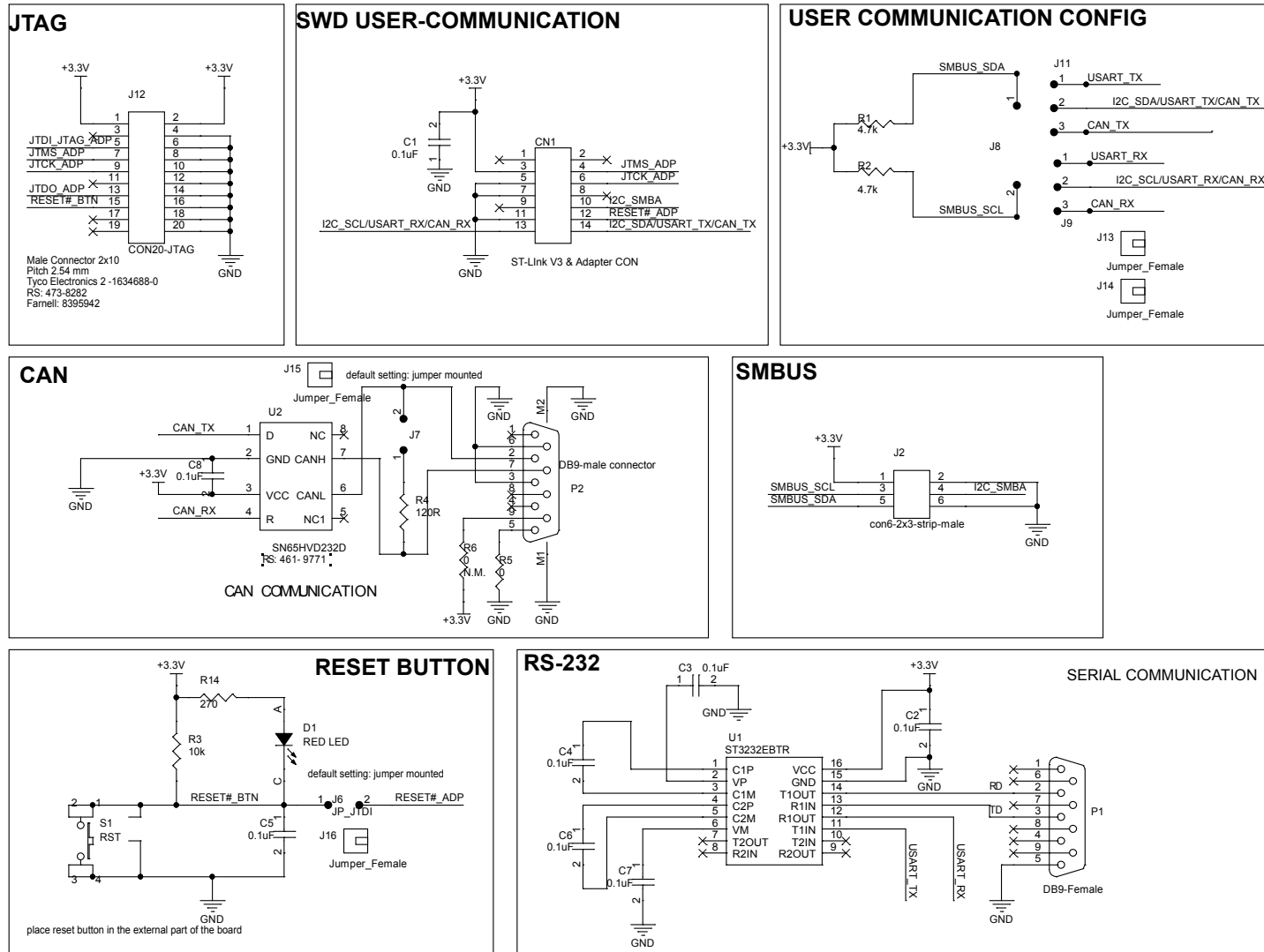


CONNECTION BETWEEN TWO CONTROL BOARDS



TO PLACE ON THE RIGHT AND ON THE LEFT SIDE OF THE BOARD, RESPECTIVELY

Figure 4. STEVAL-DPSG474 adapter board circuit schematic



2 Kit versions

Table 1. STEVAL-DPSG474 versions

PCB version	Schematic diagrams	Bill of materials
STEVAL\$DPSG474A ⁽¹⁾	STEVAL\$DPSG474A schematic diagrams	STEVAL\$DPSG474A bill of materials

1. This code identifies the STEVAL-DPSG474 evaluation kit first version. It is printed on the board PCB. The kit includes the STEVAL-DPSG474M control board, whose first version is identified by the STEVAL\$DPSG474MA code, and the STEVAL-DPSADP02, whose first version is identified by the STEVAL\$DPSADP02A code.

Revision history

Table 2. Document revision history

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

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