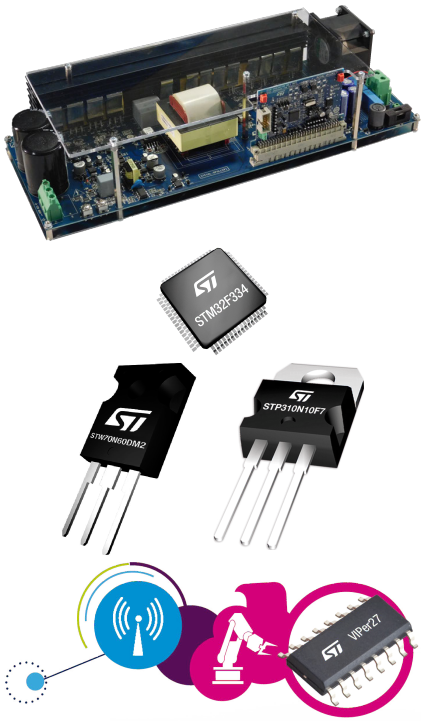
STEVAL-DPSLLCK1

Data brief

3 kW Full Bridge LLC resonant digital power supply evaluation kit



Product summary	
Bill of Materials and Schematics	
3 kW power supply evaluation kit	STEVAL-DPSLLCK1
Main components and software	
STM32F3x4 microcontroller	STM32F334
MDmesh DM2 Power MOSFET	STW70N60DM2
STripFET F7 Power MOSFET	STP310N10F7
off-line high voltage converter	VIPER27
Further reading and support	
Applications	Power supplies and converters
Community and blogs	ST Community ST blog

Features

- Power ratings:
  - input DC voltage: 375 V to 425 V
  - output voltage: 48 V
  - maximum output current: 62.5 A
  - output power: 3 kW
  - peak efficiency: 95.3%
  - HF transformer isolation voltage: 4 kV
- Resonant and switching frequencies:
  - max DC-DC switching frequency: 380 kHz (at startup)
  - closed loop switching frequency: 120 kHz to 250 kHz
  - resonant frequency: 175 kHz
- Protection mechanisms:
  - undervoltage and overvoltage protection on input and output
  - overtemperature protection
  - short-circuit protection
  - forced cooling with air flow speed modulation according to the output power and temperature
- Efficiency:
  - adaptive synchronous rectification
  - light load burst mode
- Digital control with STM32F334 microcontroller

Description

The STEVAL-DPSLLCK1 is a digitally controlled 3 kW full bridge LLC resonant DC-DC converter with output synchronous rectification. The kit consists of a power board, digital control board, adapter board, and firmware modules.

The full bridge primary section of the LLC converter is based on MDmesh DM2 Power MOSFETs for high efficiency performance. The PWM switching frequency is digitally controlled to regulate the output voltage. The converter operates at near resonant frequencies to maximize efficiency and achieve Zero Voltage Switching (ZVS) over the entire operating range.

The HF transformer provides galvanic isolation and magnetic integration of the inductive elements for a compact design.

Synchronous rectification (SR) with STripFET F7 Power MOSFETs is employed on the secondary side to reduce conduction losses.

The STM32F334 microcontroller on the digital control board embeds a high resolution timer for finer regulation and can communicate status information via USART, CAN, SMBus, and opto-coupled serial communication.

Both the primary and secondary sections are supplied by an off-line flyback circuit based on VIPer27HD which provides regulated voltages to the control board, the gate driver ICs and the signal conditioning circuits.

You can connect a PFC to the power board and extend communication and interfacing with the supplied adapter board.

1 STEVAL-DPSLLCK1 schematics

Figure 1. **STEVAL-DPSLLCP1 power board - LLC power stage schematic**

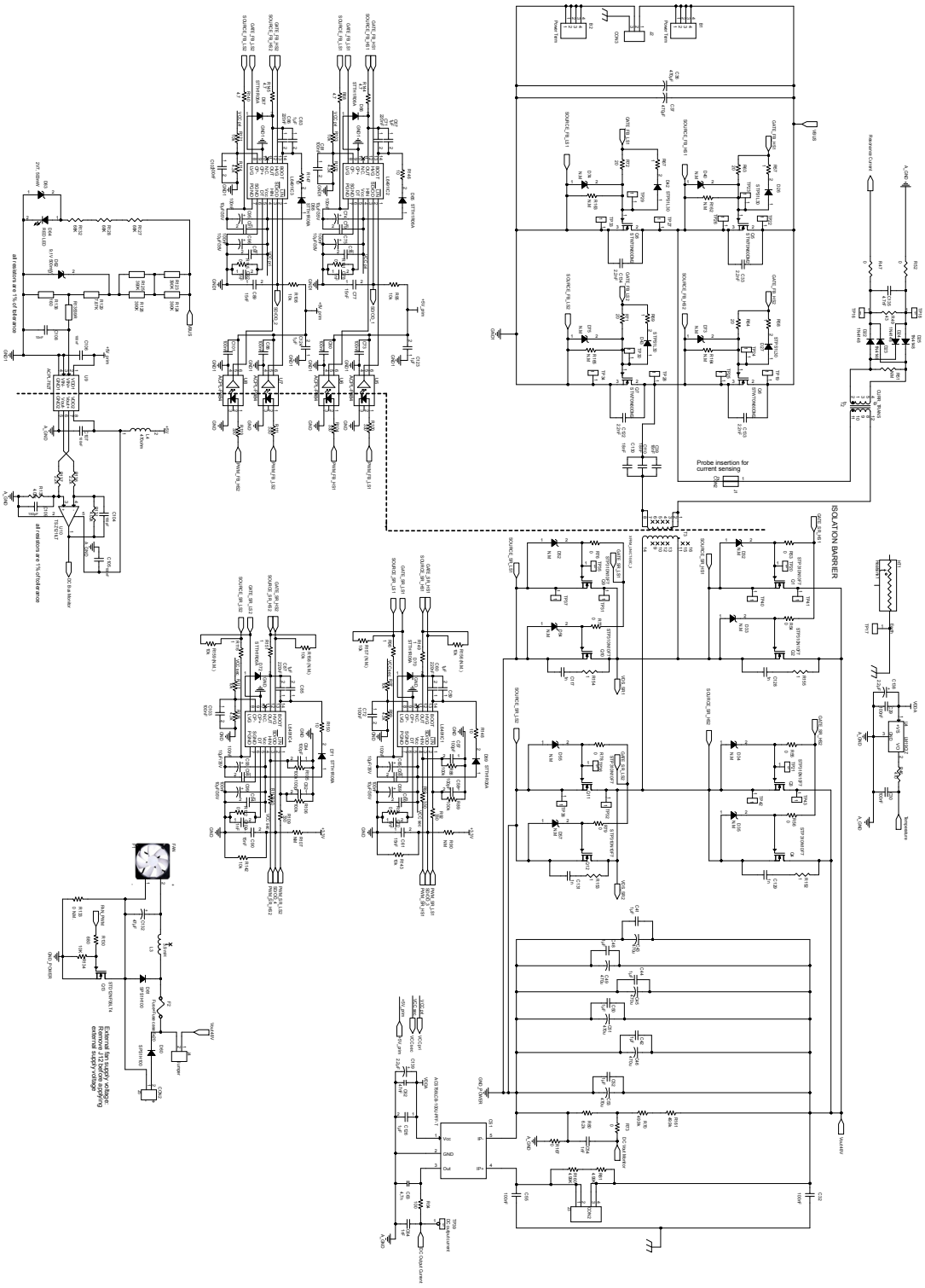


Figure 2. **STEVAL-DPSLLCP1 power board - Aux SMPS schematic**

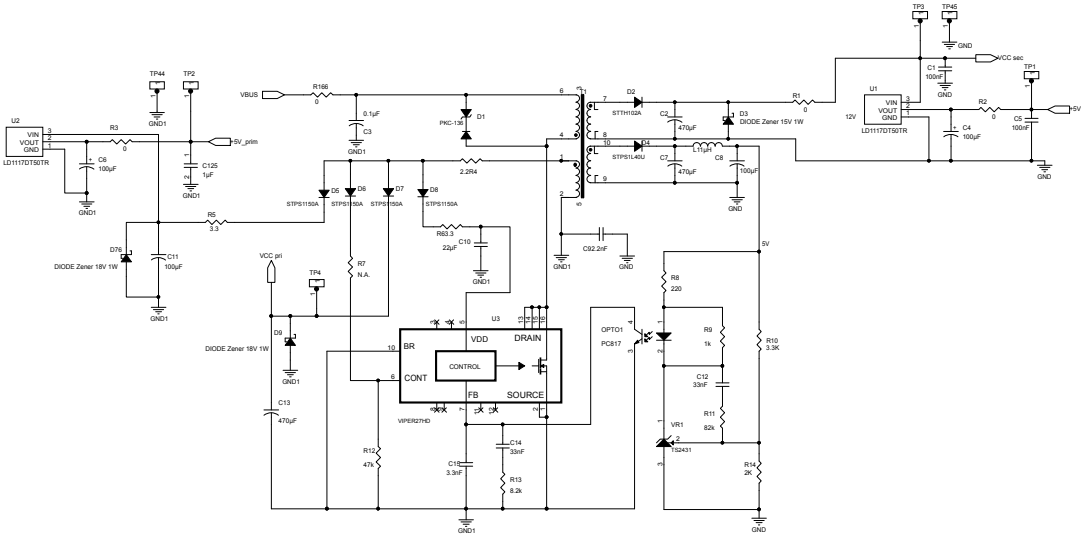


Figure 3. **STEVAL-DPSLLCP1 power board - filtering and connector schematic**

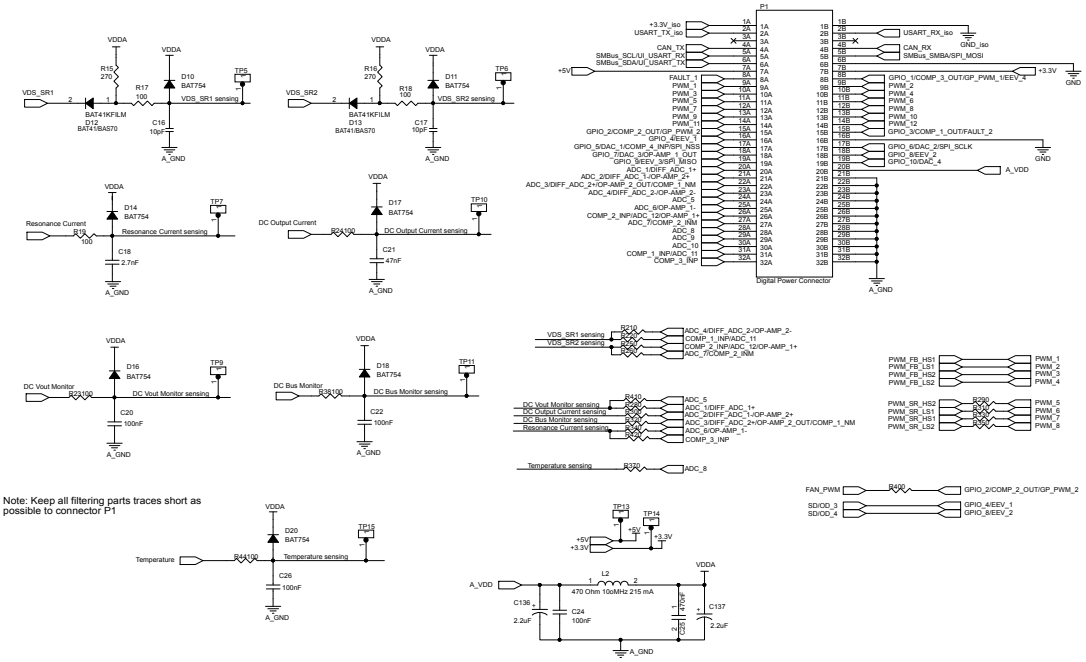


Figure 4. STEVAL-DPSLLCP1 power board - mechanical parts

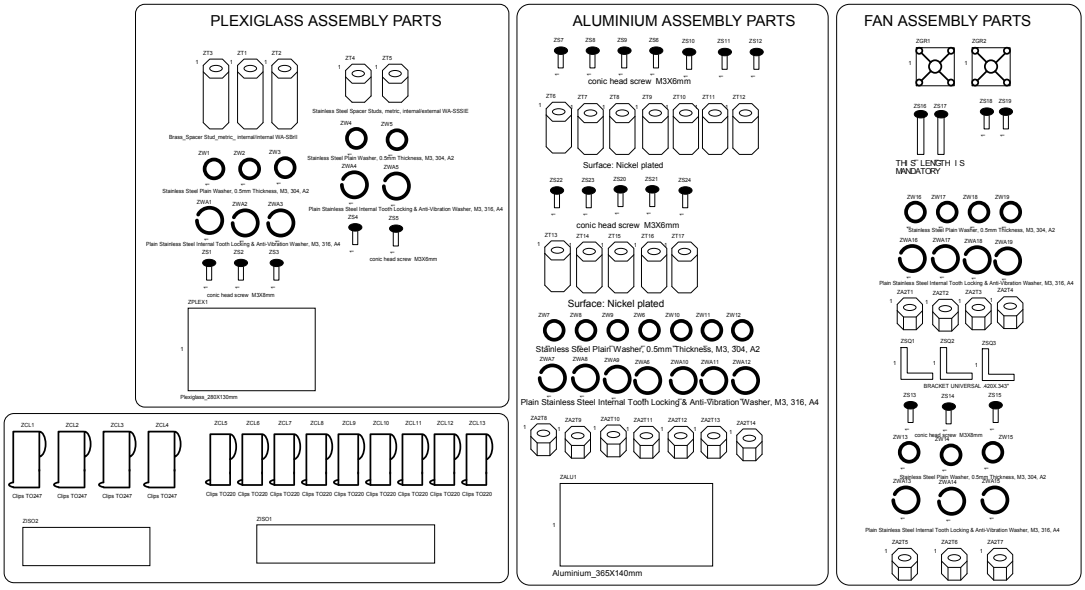


Figure 5. STEVAL-DPS334C1 control board - MCU and connector schematic

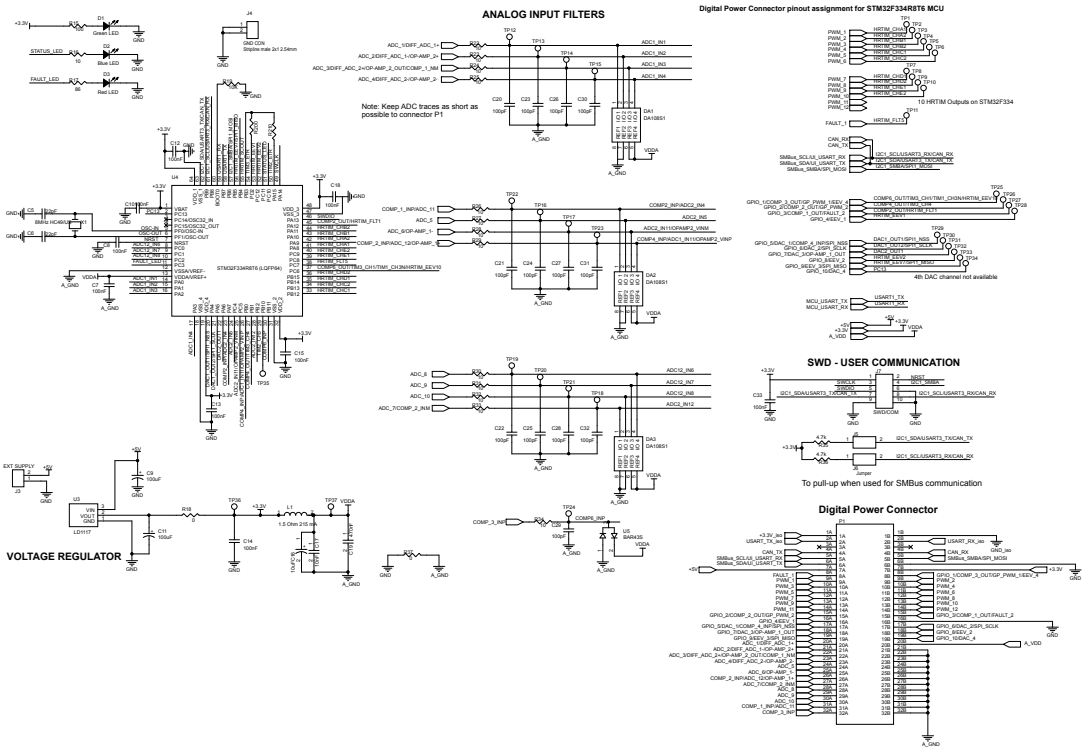


Figure 6. STEVAL-DPS334C1 control board - opto-isolated communication schematic

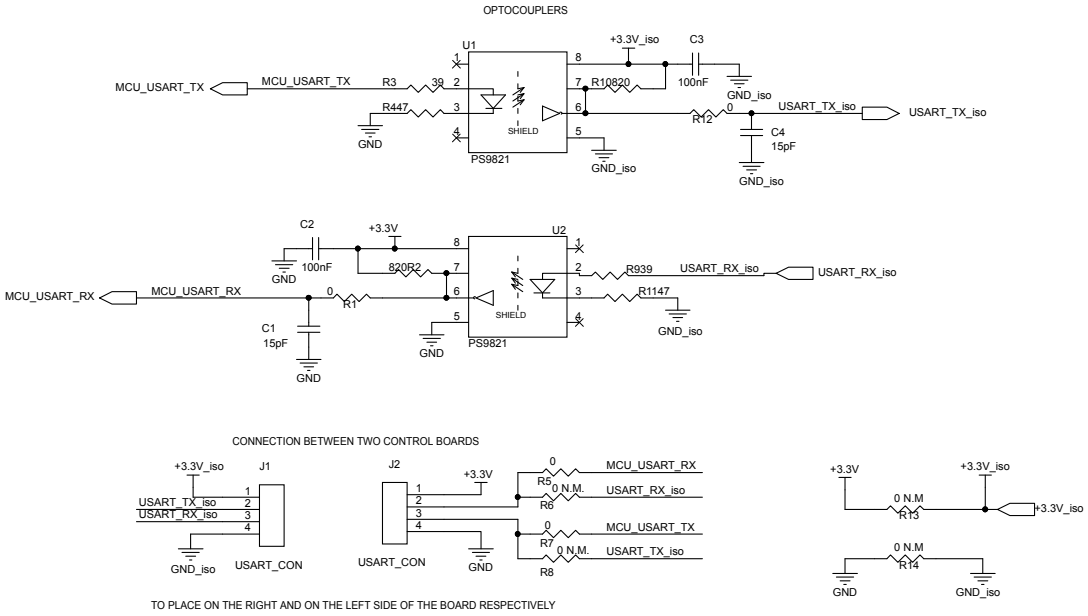
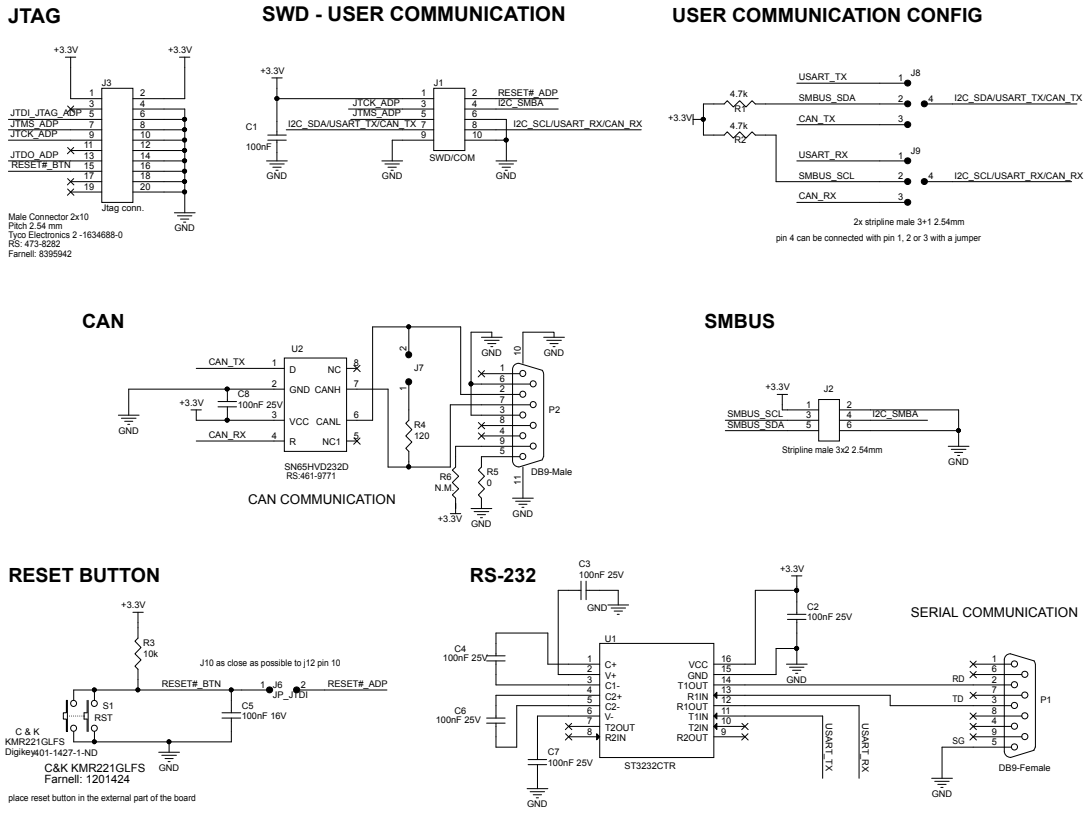


Figure 7. STEVAL-DPSADP01 adapter board schematic



Revision history

Table 1. Document revision history

Date	Version	Changes
20-Mar-2018	1	Initial release.
15-Mar-2019	2	Updated Applications link in the Section Product Summary table

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