

ITEM 0 - SmartRCP

SmartRCP



SMARTRCP +
INTERFACE &
OSCILLOSCOPE

DEMO
BUCK

PACK IPs
CTRL DC

RCP CAPABILITIES

RTS CAPABILITIES

ITEM 2 - CONTROL TEMPLATES

ITEM 3 - REAL TIME SIMULATION

ITEM 1 - IPs AC

PACK IPs CTRL AC

CTRL TEMPLATES (Control Stage)

CTRL 1
CTRL 2
CTRL 3
...

RTS MODELS (Power converter plant and electric models)

RTS 1
RTS 2
RTS 3
...

ITEM 0 - SmartRCP

» HARDWARE PLATFORM AND DEMO

- User interface
- Oscilloscope
- Buck converter

» IPS CTRL DC

- PWM Modulator
- Phase-shift modulator
- PI, PID regulators
- 1st order low pass filter
- RMS calculator
- Soft-Start ramps

ITEM 1 - IPS CTRL AC

» IPS CTRL AC

- Active/reactive power calculator
- SVPWM modulator
- Classic NPC modulator
- DPWM1 modulator
- DPWM1Max modulator
- ANPC modulator
- PLL regulator
- DQ transform
- Motor flux estimator

ITEM 2 - CTRL TEMPLATES

» CTRL TEMPLATES

- Synchronous buck converter (DC)
- Single-phase DAB converter (DC) - SPS
- Single-phase DAB converter (DC) - TPS
- 3-phase DAB converter (DC)
- 3-phase boost inverter-rectifier (DC) - 3 legs
- 3-phase boost inverter-rectifier (DC) - 4 legs
- Alhambra converter (DC)
- Full bridge converter (DC)
- 3-phase Vienna rectifier (AC)
- Single-phase boost PFC (AC)
- Single-phase Totem-pole PFC (AC)
- 3-phase buck rectifier (AC)
- 3-phase motor drive (AC)
- Single-phase Vienna rectifier (AC)

ITEM 3 - RTS MODELS

» CONVERTER MODELS

- DAB converter plant
- 3-ph Boost Inverter plant
- Synchronous Buck Converter plant
- Vienna Rectifier plant
- Others

» ELECTRIC MODELS

- Li-ion battery model
- Solar panel model
- 3-phase electrical grid model
- Permanent magnet synchronous motor model
- Asynchronous induction motor model
- Real MOSFET&Cascode half-bridge model
- Foster thermal network model

» FEATURES

BASED IN A XILINK KRIA K26 SYSTEM ON CHIP (SoC)

- Unlimited access to all FPGA resources and six high-end ARM microprocessors available.

NOT BLACK BOX APPROACH

- Program the FPGA by using HLS or directly in VHDL or Verilog. The code validated by RCP can be exported directly into the final Control Unit.
- Detailed templates, tutorials and demo boards to start and accelerate.

FOR MULTIPLE PURPOSES AND APPLICATIONS

- General and specific control algorithmic validation (Rapid Control Prototyping).
- Power converter validation (FW departments for debugging and testing).
- Control algorithmic pre-certification (multiple scenarios, like grid deeps).
- Finite State Machine (FSM) testing.
- Digital Twin (DT) and Real Time Simulation (RTS) systems.
- Laboratory experiments for control testing using emulation power plants and real power hardware.

» DETAILED CONNECTIVITY

ANALOG AND DIGITAL

- 32 Digital inputs 0-24V (Isolated – sampled at 10kHz)
- 32 Digital outputs 0-24V (Isolated – updated at 10kHz)
- 36 PWM output channels (0-5V RS422 – Differential Isolated – sampled at 4ns)
- 12 Fast analog input channels (0-5V–12bits – 3Ms/s)
- 12 Slow input analog channels (0-5V–12bits – 500ks/s)
- 16 Analog output channels (0-5V–16bits – 500ks/s)

HIGH-SPEED SERIAL CONNECTIVITY

- 1 Ethernet (1GB – RJ45)
- 4 USB 2.0
- 1 MicroSD card

INDUSTRIAL CONNECTIVITY

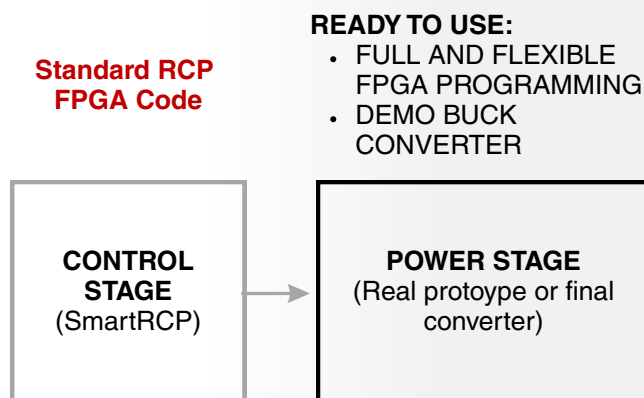
- 2 UART (USB converted)
- 2 RS485 (Full/Half duplex)
- 1 MicroSD card

ADDITIONAL FEATURES

- 1 Programming and debugging microUSB
- 1 Reset button
- Power requirements (24V – 60W max)

» USES

USE 1: SmartRCP FOR RAPID CONTROL PROTOTYPING (DEFINED IN C OR VHDL)



USE 2: SmartRCP FOR RAPID CONTROL PROTOTYPING + REAL TIME SIMULATION

