

Digital Output Board and Motherboard

**Brief description of the DIGOUT-xxxx-PWM-1A/16-yyyy
and
the Motherboard ISSMB1-4IO**

DIGOUT + Motherboard Electronic Development

Development by:

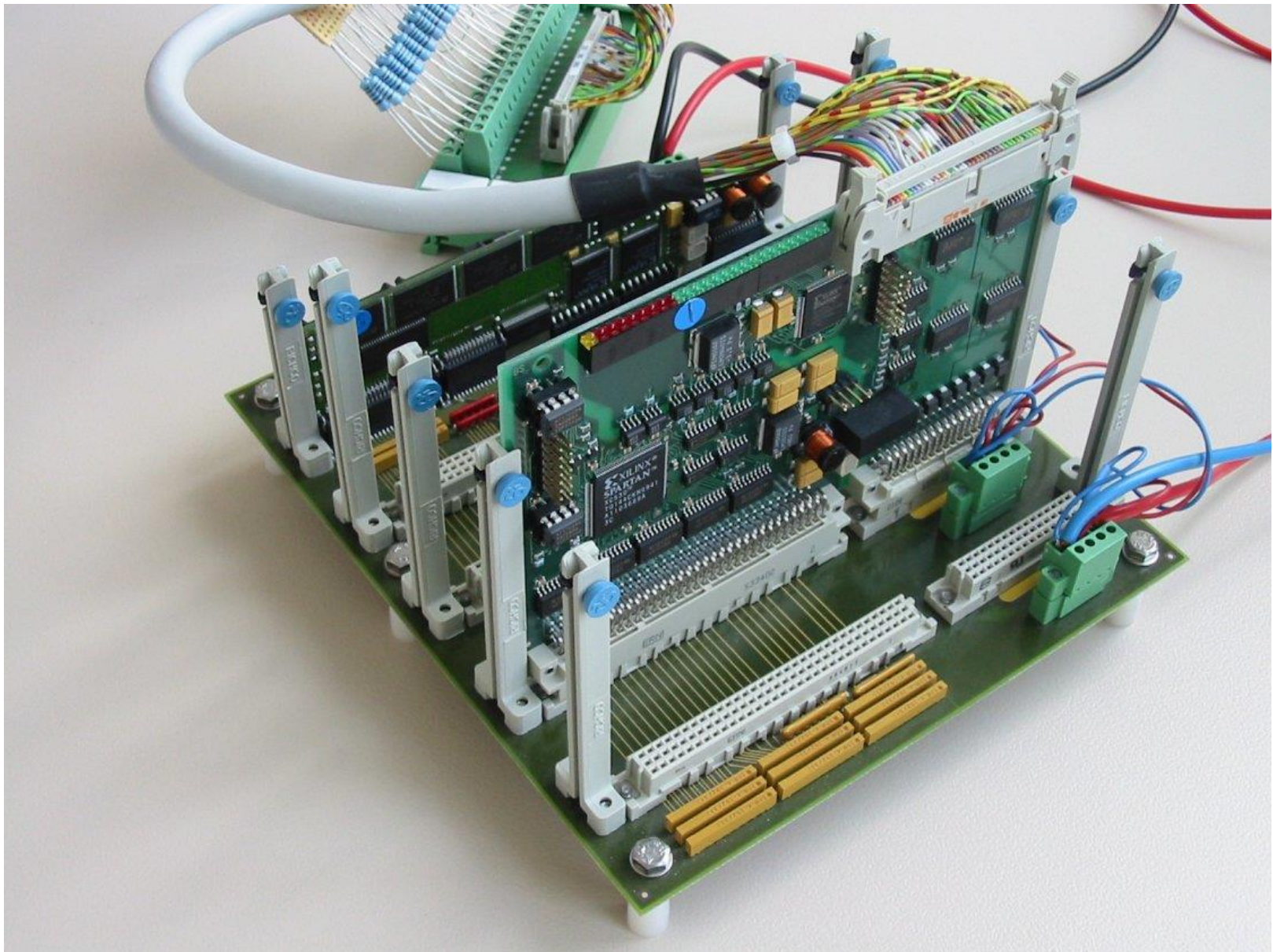
Ingenieurbüro für Prozeßautomatisierung ifp
Dipl.-Inf. Bernd Beisch
Internet: www.ifp-beisch.com

Based on:

CPU ISS1.2, AMD 486, 100 MHz, Embedded QNX 4.25,

Status:

Prototype is now manufactured, finished June 2000



Mother-Board Schematics

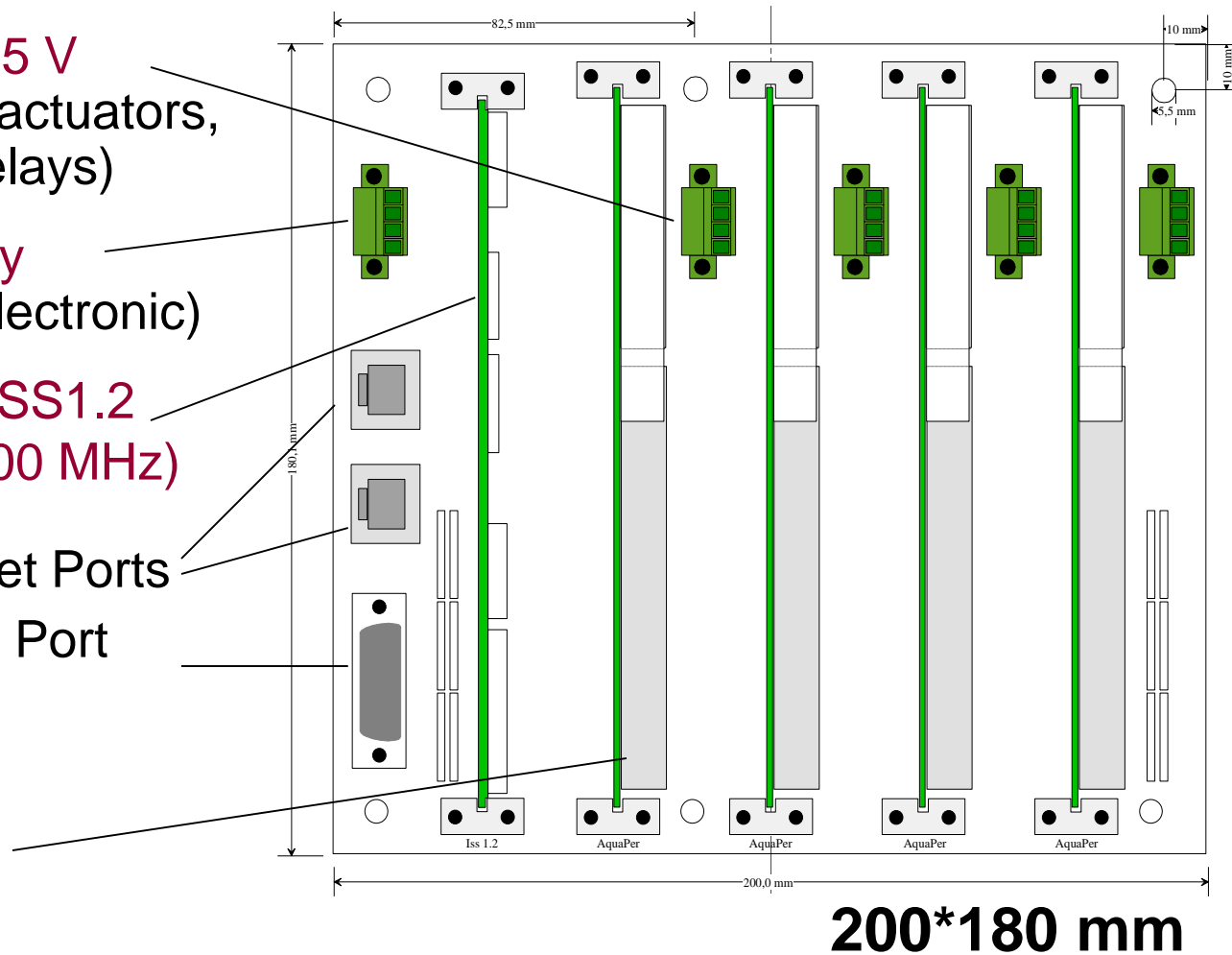
Power 2*5..35 V
(switched to actuators,
1 line for 8 relays)

Power Supply
(7-35V, for Electronic)

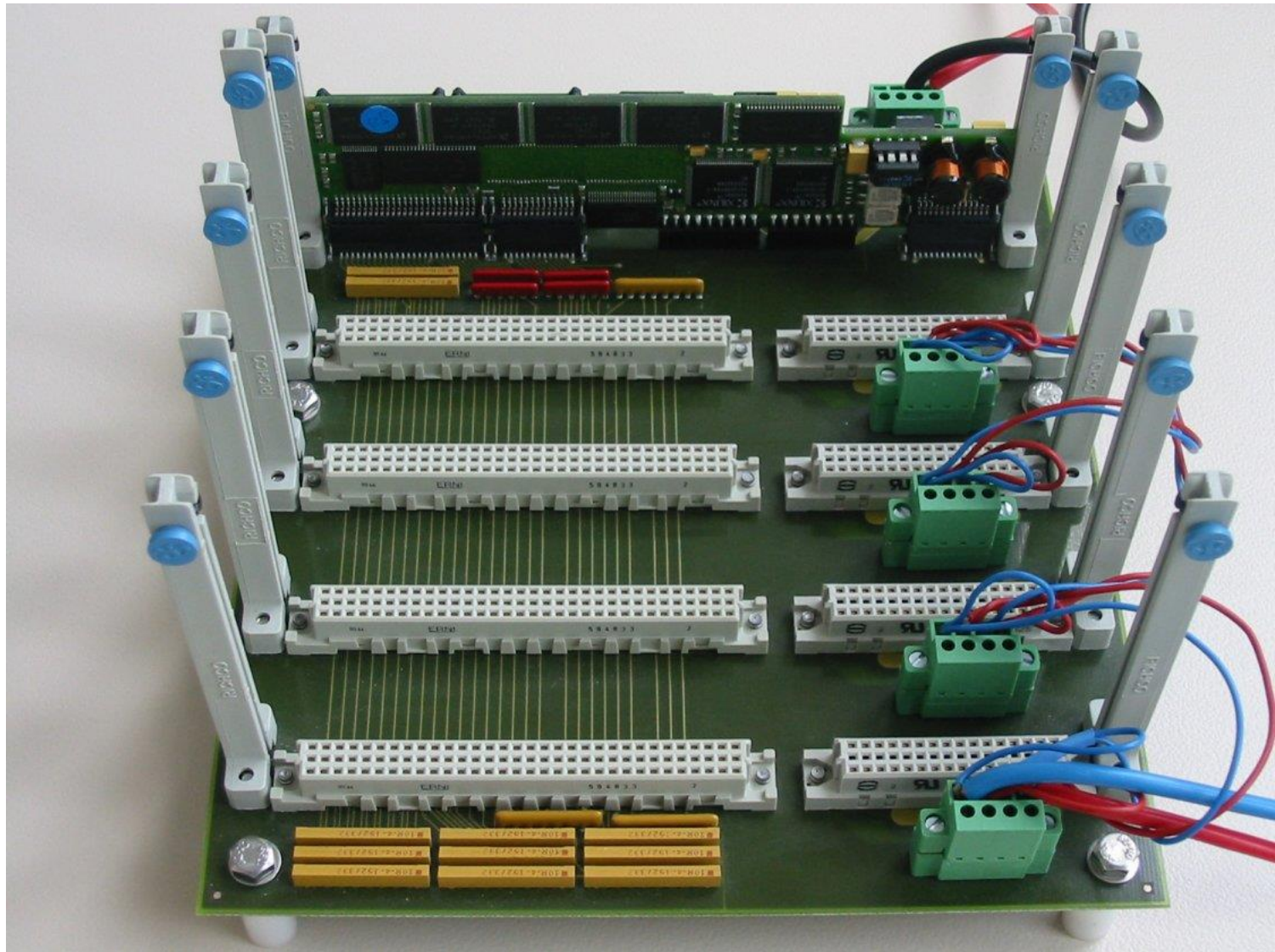
CPU Board ISS1.2
(486 MHz, 100 MHz)

- 2 Ethernet Ports
- 1 RS422 Port
(Service)

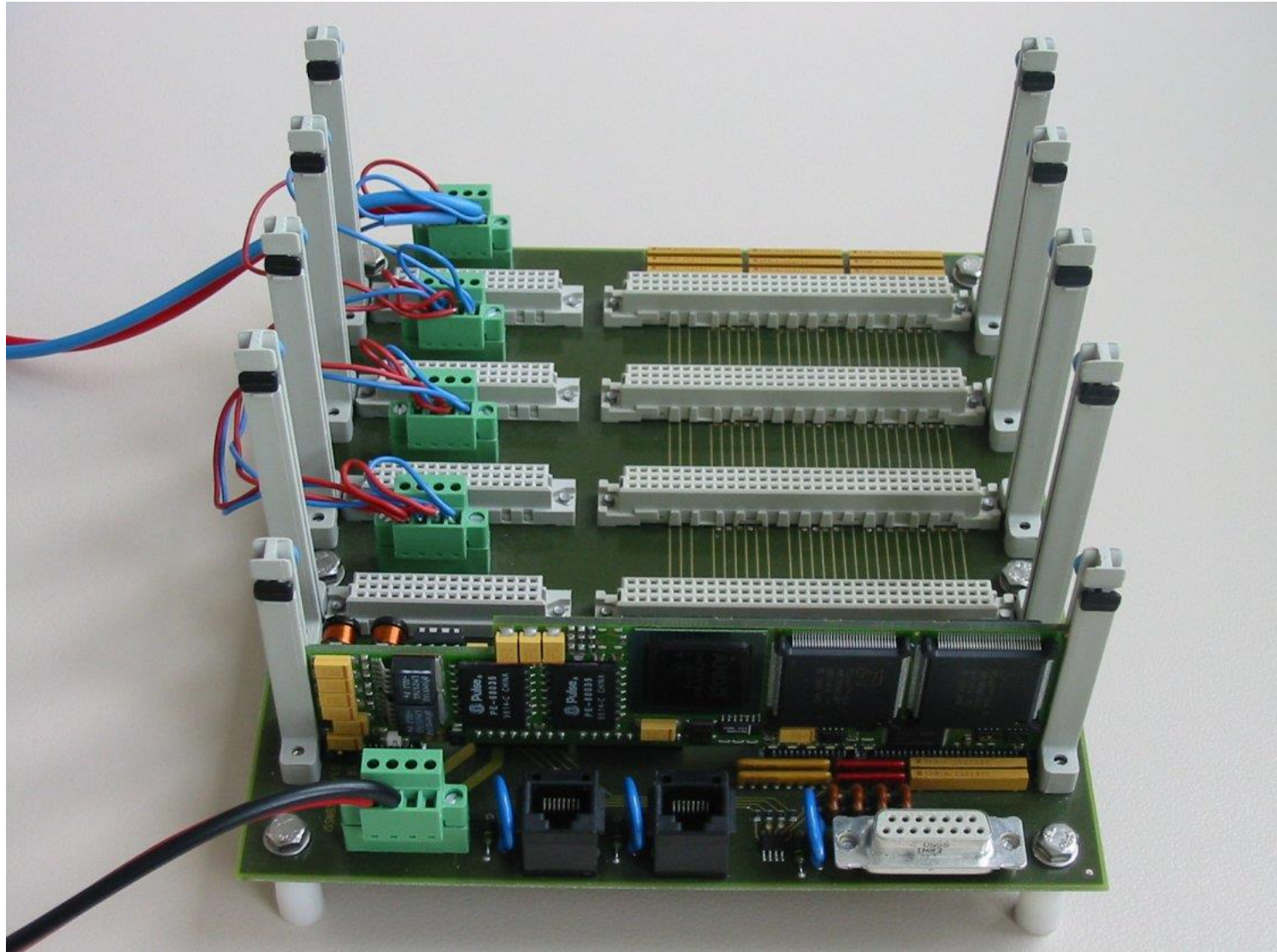
4 IO-Boards
(ISA)



Mother - Board



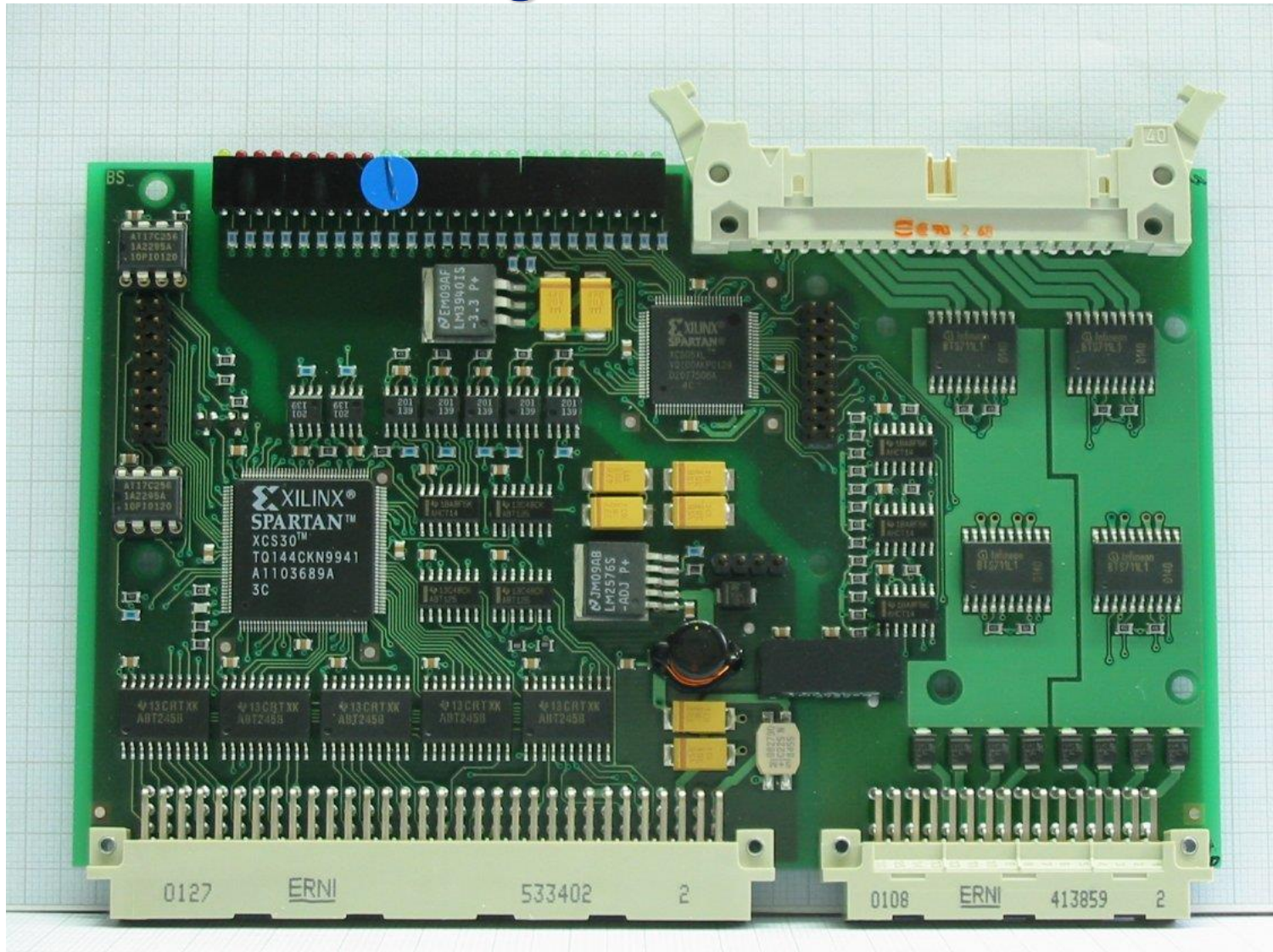
Mother - Board



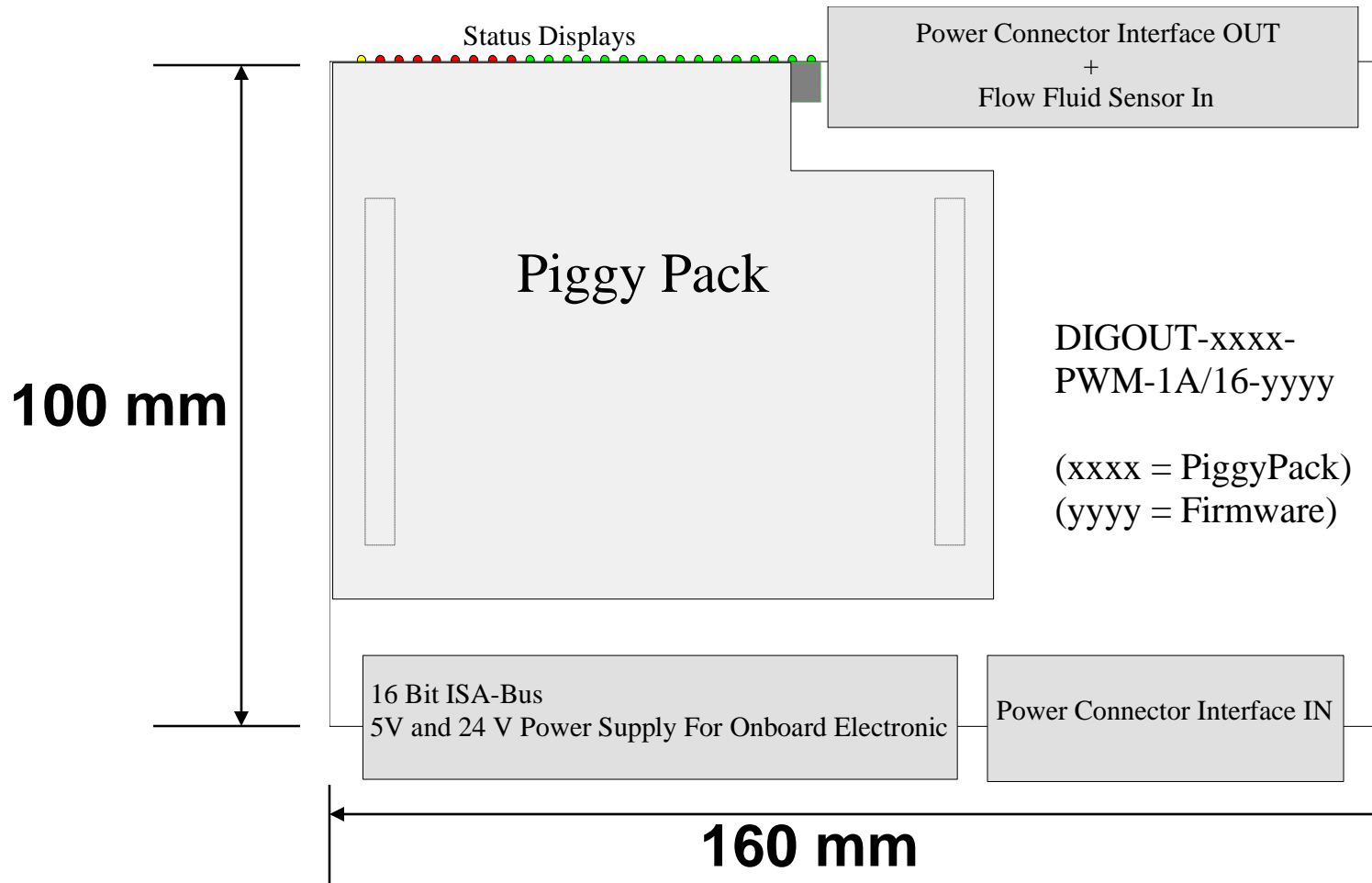
DIGOUT - Board - Overview

- **16 bit ISA-bus-board**
- **16 digital outputs (High-Side Power Switching)**
- **Each digital output has its own PWM (Pulse Width Modulation)**
- **The basis board can be individually adapted for various applications**
 - via piggy packs
 - via firmware updates (per download to SE²PROM (serial E²PROM))
 - via download from internet

DigOut Board



DIGOUT - Board Schematics



DIGOUT - Board Characteristics I

- Operating temperature 0 ... 70 °C
- Dimension 100 mm * 160 mm
- FPGA 10000 systems gate XILINX
- Firmware storage (SE²PROM) 256 KBit
- On/off status display One green LED for each output
- Error status display One red LED together for two output
- ESD protection 0,5 KV
- Power connector interfaces
 - In 32 pin VG connector, max. 1 A/pin, 5V ..
34V
 - Out 40 pin Harting, max. 1 A/pin

DIGOUT - Board Characteristics II

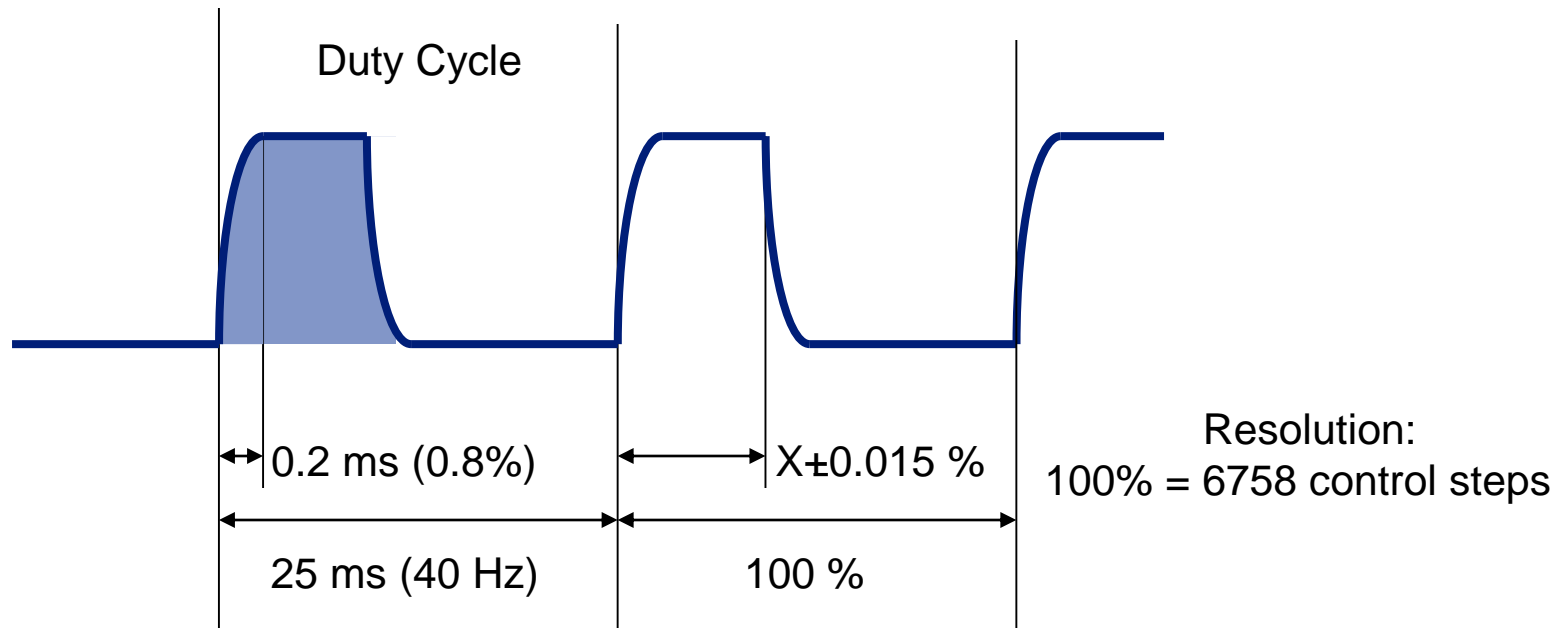
- Bus interface 16 bit ISA-bus via 96 pin VG connector
- Power supply for onboard electronic 5V and 24V via 96 pin VG connector
- Piggy pack interface 8 bidirect connections to FPGA
8 bidirect connections to power connector interface OUT

High-Side Power Switch Characteristics (Power Connector OUT)

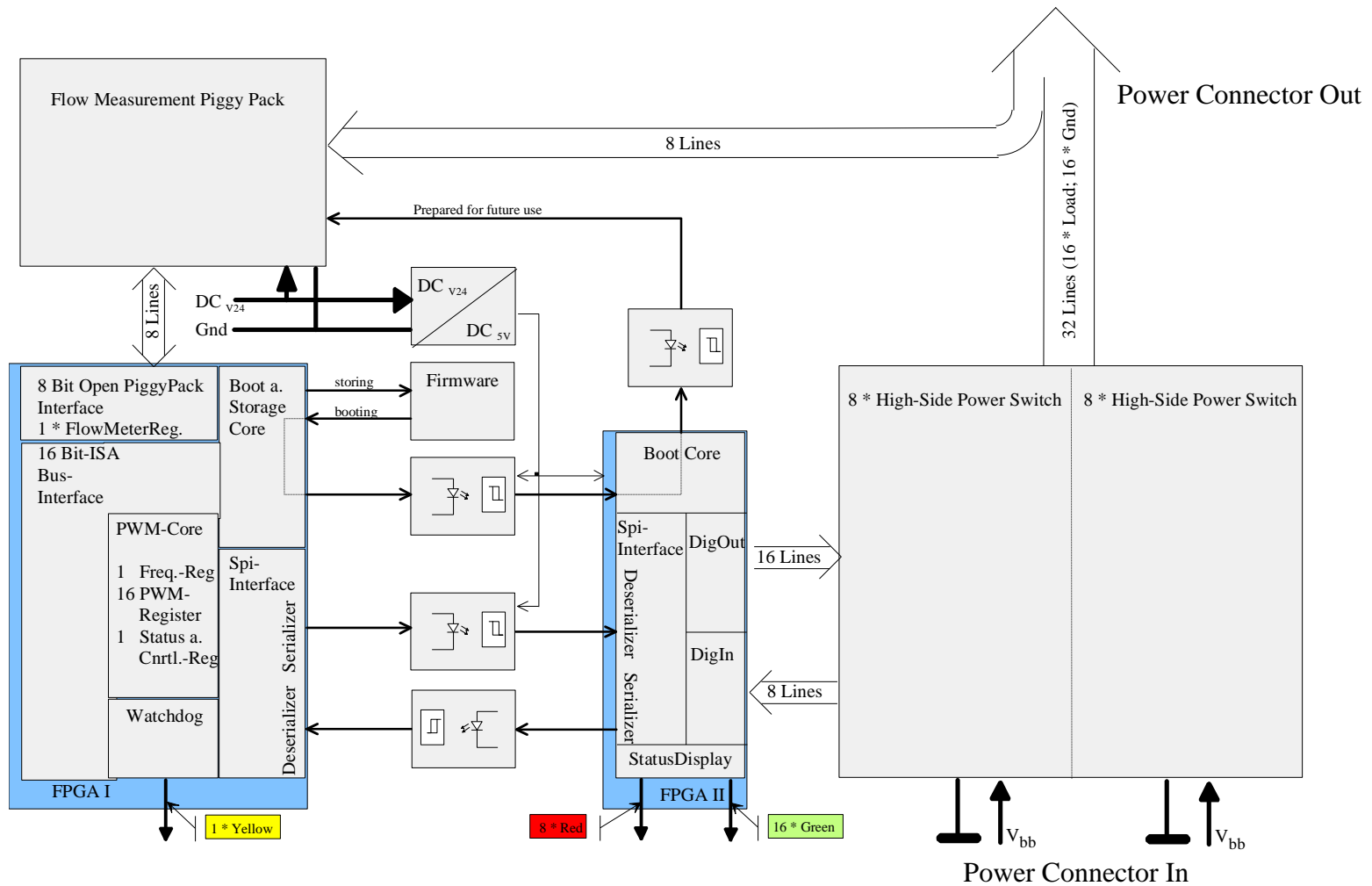
- Nominal load current 1 A
- Operating voltage 5.0 ... 34 V
- Overvoltage protection 43 V
- Overload protection (auto shutdown) 150 °C (chip temperature)
- Short-circuit protection
- Current limitation 4 A
- Undervoltage shutdown 5 V
- Overvoltage shutdown 34 ... 43 V
- Turn on time to 90 % V_{out} Typ. 200 μ s
- Turn off time to 10 % V_{out} Typ. 200 μ s

Pulse Width Modulator PWM Characteristics

- basis frequency register 16 bit, 4 Hz..1kHz
- duty cycle registers (for each output) 16 bit
- resolution of duty cycle 1 bit ~ 3,8 μ s



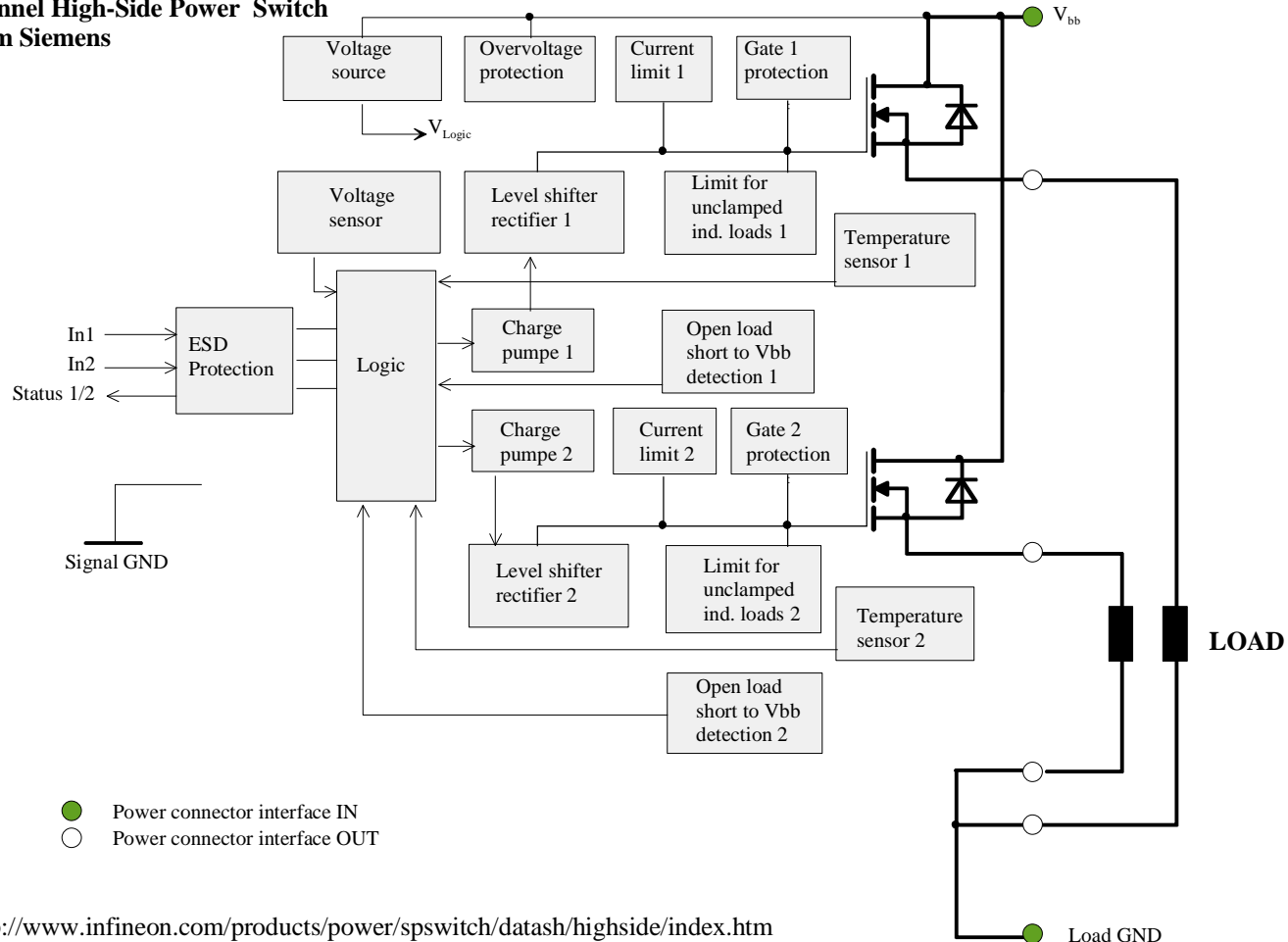
Block Diagram DIGOUT - Board



DIGOUT - Board

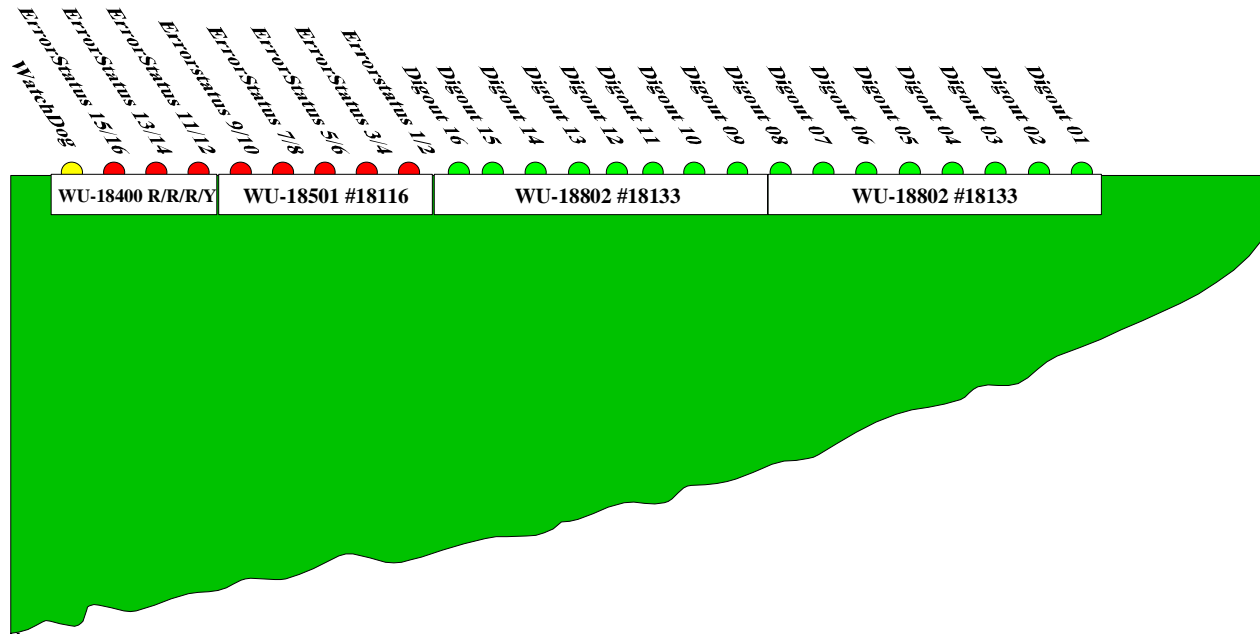
Block Diagram of two Channels of High-Side Power Switch BTS 711 L1

BTS 711 L1 is a smart four channel High-Side Power Switch from Siemens



<http://www.infineon.com/products/power/spswitch/datash/highside/index.htm>

DIGOUT - Board Status Display



Example - Piggy Pack (AquaPro)

- **For AquaPro:** measure the quantity of fluid flowing through a counting flow meter
- **Alternate possibilities (in discussion):**
 - get analog/digital feedback signals
 - feedback actuator actual signals
 - detect zero-voltage-transition points and thereby enable a phase control circuit
 - ...

Flow Measurement Piggy Pack Characteristics

- Sensor connector 3 pin, via Power Connector Out
- Electrical characteristic to sensor 24 V, open collector 100 mA
- Value register via FPGA 16 bit; update frequency min. 4 Hz
- Status display One green LED
(frequency input OK)
- Dimension 100 mm * 80 mm

Designed for Flowmeter KOBOLD DF* (or similar)

i.e. DF-24:

- 24 l/min = 1440 l/h
- 233 Impulse/l
- 93 Hz = 100% flow