10 Mb/s Single Twisted Pair Ethernet
Evaluation Board for 4B3T PHY Proposal

Steffen Graber
Pepperl+Fuchs

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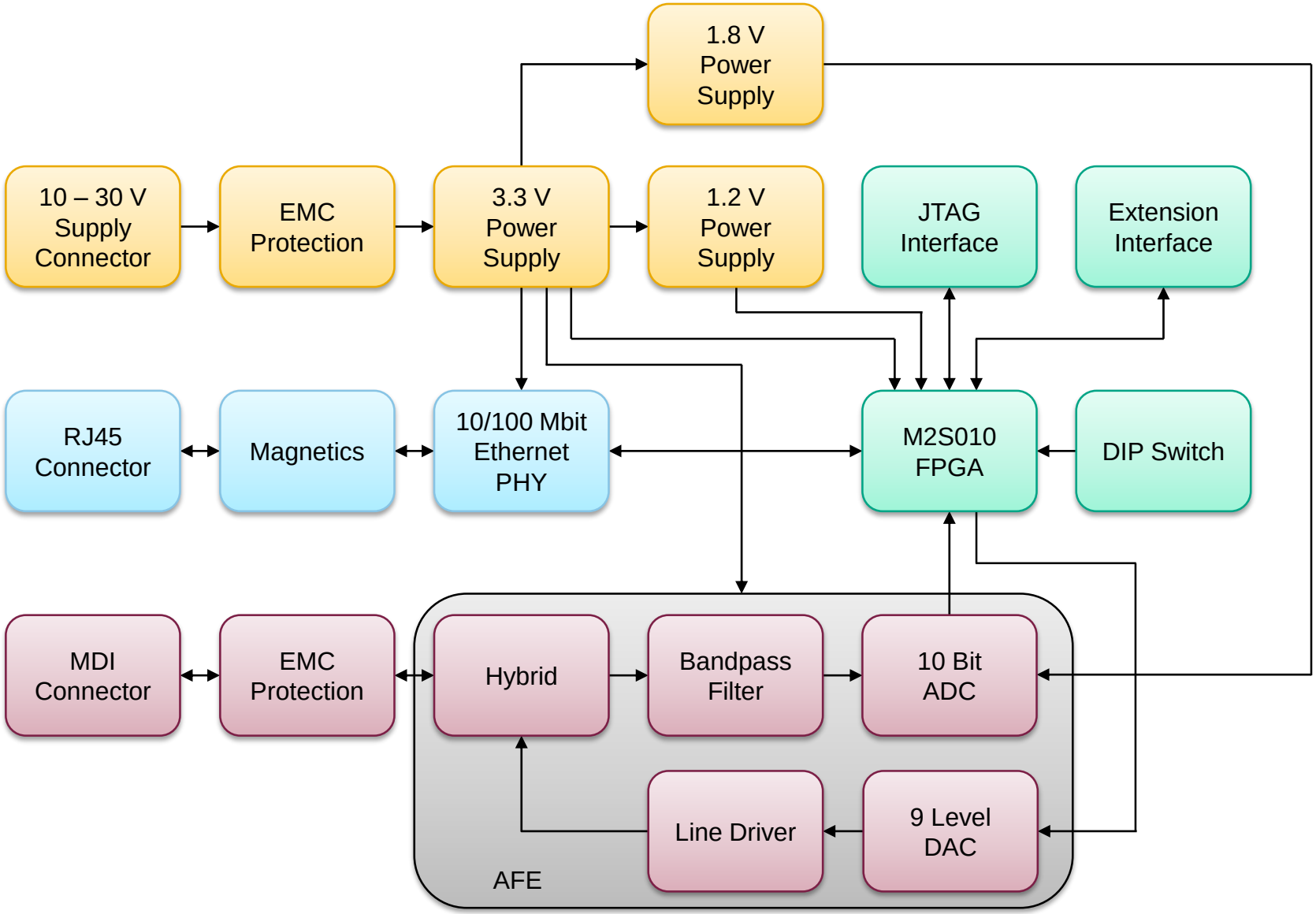
Evaluation Board Intention

- During the last meeting some „PHY Ideas“ have been presented.
- An early implementation has also been shown inside this presentation.
- Nevertheless the shown setup would not be suitable e.g. to do reliable EMC testing.
- To verify how a possible implementation behaves in real life applications we decided to build a small evaluation board to be able to do e.g. noise, environmental and EMC tests with these boards.
- If everything runs smooth, the idea is to present first results within the next interim meeting.

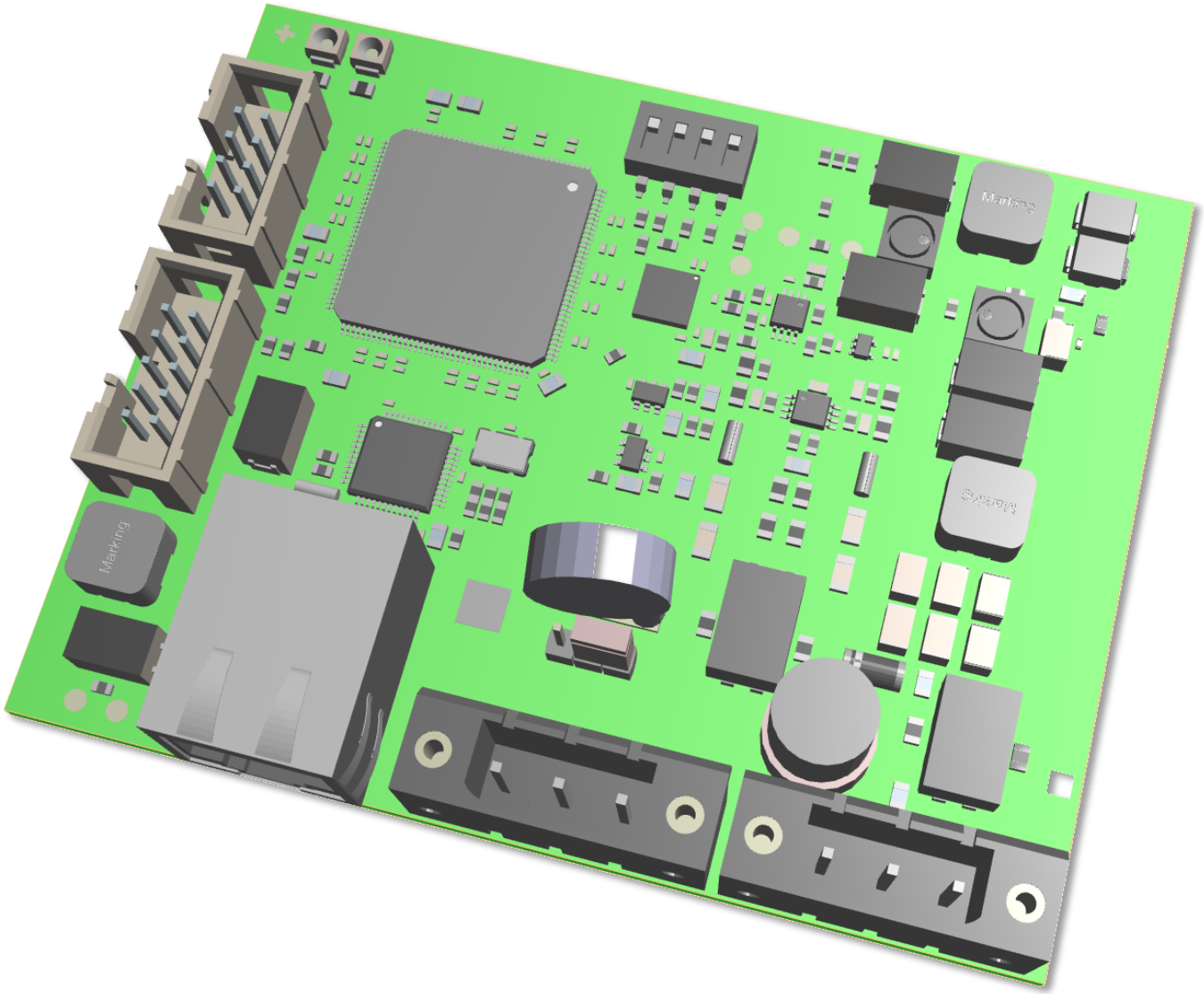
Evaluation Board Block Diagram



Evaluation Board Description

- Supply: 10 – 30 V
- Host Connection: 10BASE-T, 100BASE-TX, RJ45 connector with integrated magnetics
- Discrete Analog Frontend
  - Voltage Mode Driver, 2.4 V_{pp} Transmit Amplitude
  - Analog Echo Cancellation
  - Bandpass Filter, 200 KHz to 8 MHz
  - 10 Bit ADC (selectable input voltage range 1.0 V to 2.0 V, running at 7.5 MSPS/s (3 to 20 MSPS/s possible))
  - 9 Level DAC
- M2S010 SOC FPGA
  - Approx. 12000 LEs (4-Input LUT + DFF)
  - 22 Math Blocks (18 x 18 Bit Multiplier)
  - Integrated Cortex-M3
  - External 10 MHz VCXO
- EMC Protection
  - Current Compensated Choke
  - Surge Protection
  - Hard Grounding or Capacitive Grounding of Cable Shield
- Extension Interface to APL Evaluation Board
  - Powered Link Segment
  - Expansion with higher density FPGA (if necessary)

Evaluation Board Assembly



EMC Testing

- EMC test levels according to EN 61326-1 (electrical equipment for measurement, control and laboratory use) and NE 21 (practical procedures for determining whether the devices used in laboratory and process control are immune to interference).

- EFT
  - 1 kV, 5 kHz (15 ms/300 ms), 100 kHz (0.75 ms/300 ms)
- Conducted Immunity
  - 10 V/m, 10 kHz to 80 MHz
- Radiated Immunity
  - 10 V/m, 80 MHz to 1 GHz
  - 10 V/m, 1.4 GHz to 2 GHz
  - 3 V/m, 2 GHz to 2.7 GHz
- ESD (HBM)
  - 6 kV (indirect discharge)
  - 8 kV (direct discharge, only on terminal screws, there is no housing)

- Single data packets may be lost during EMC testing (standard industrial protocols allow up to 2 retransmissions of a message).

Thank You