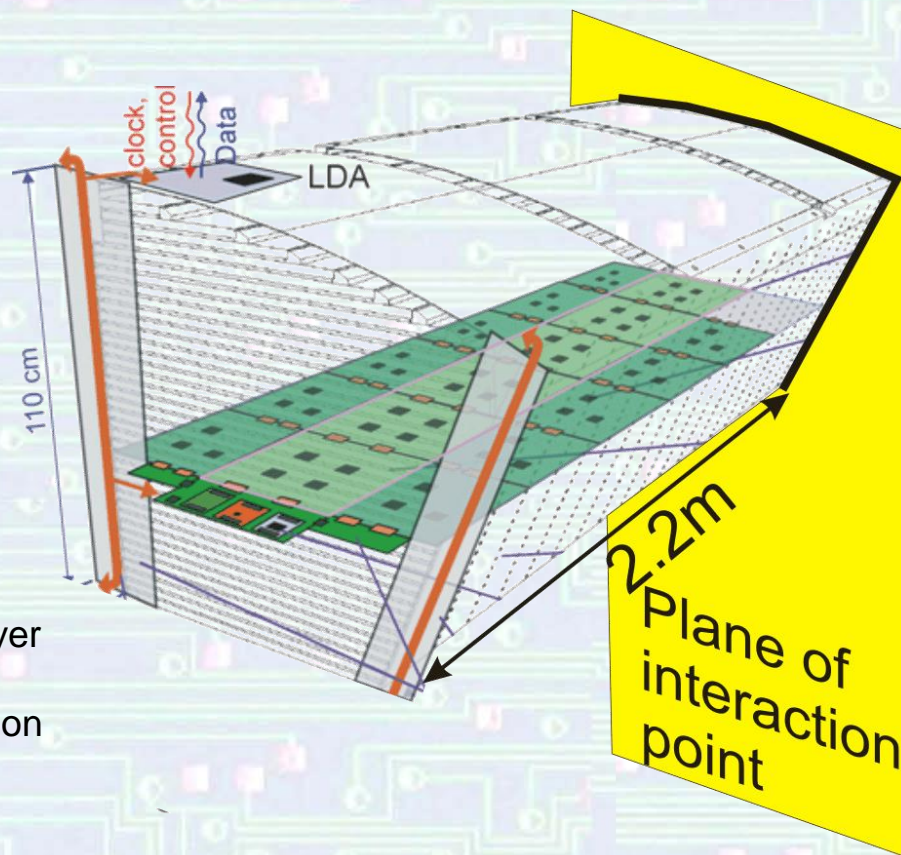


Present Status Of Design Of Multichannel Power Supply For AHCAL SiPMs.

Shutov Vitaly, JINR

DESY, December 10th, 2012



Primary external power supply for SiPMs:

- one per layer – no HV grouping
- floating output
- grounding point for each layer should be at the layer itself
- the final voltage regulation is done on the calibration board

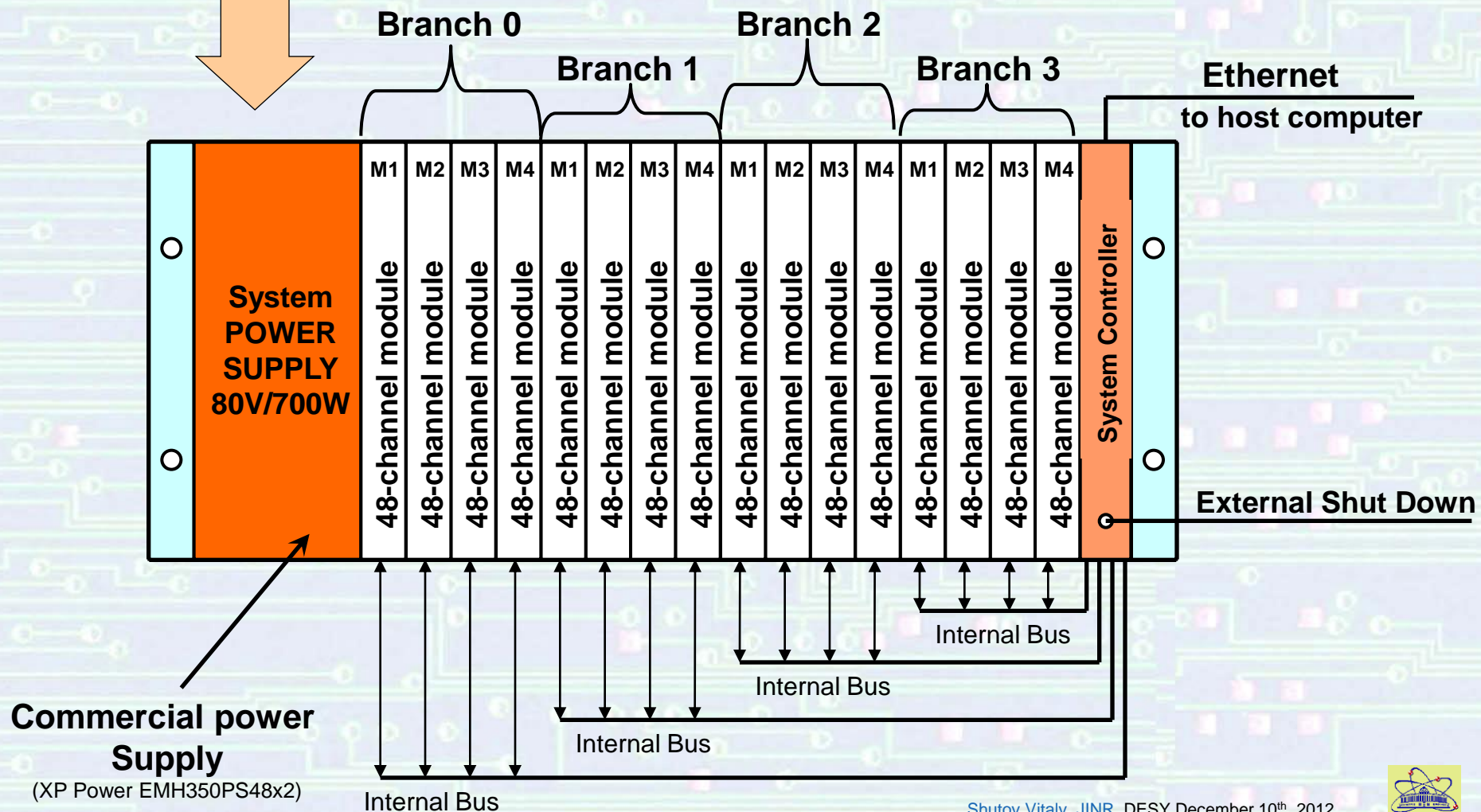
Baseline numbers:

- 48 layers per half octant
 - 32 half-octants
- Total number of channels: $48 \cdot 32 = 1536$

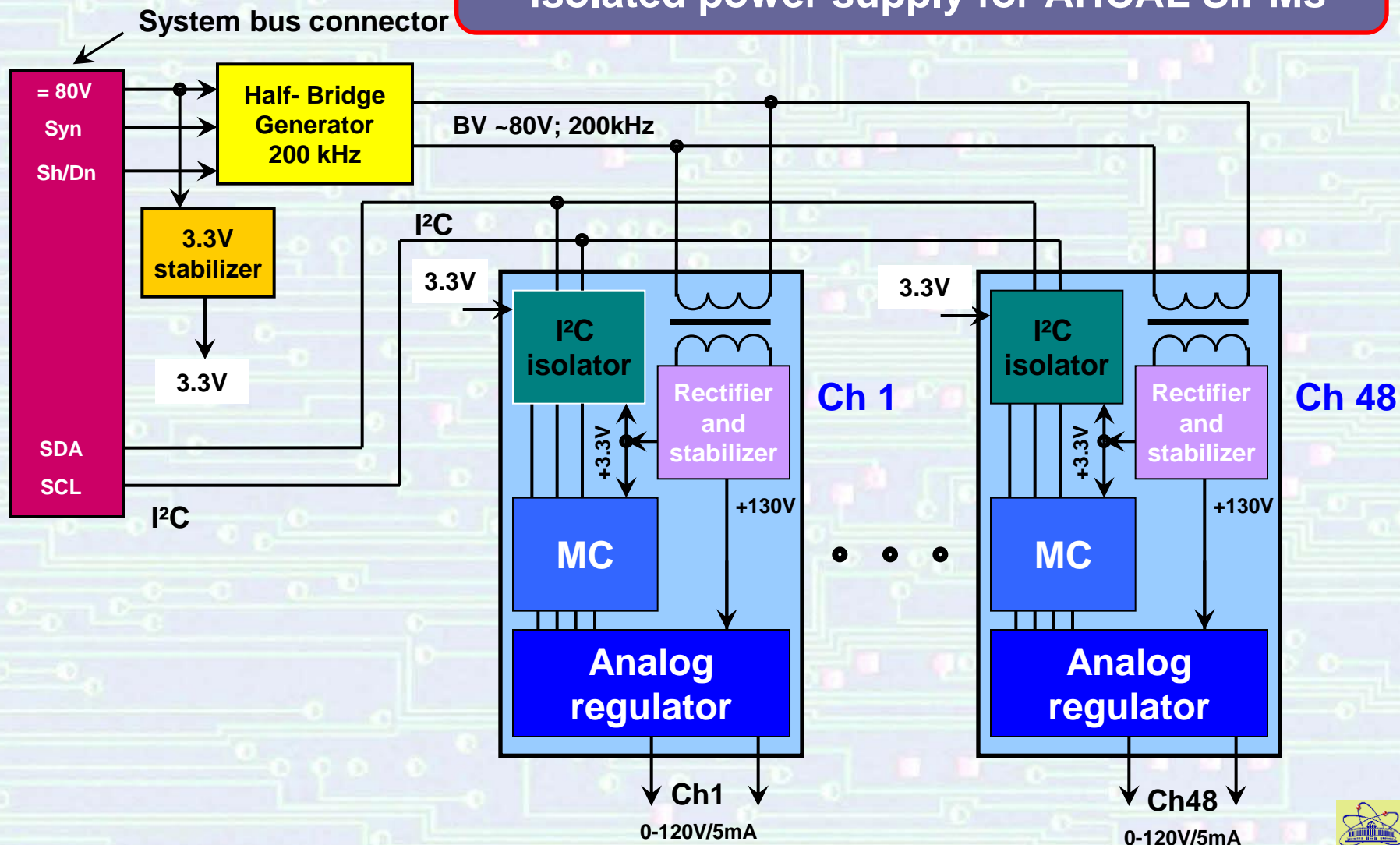
768 channels per crate -> two 19-inch 6U crates.

768 channels per crate
Euro-mechanics 6U

System configuration



48-channel EM-module of isolated power supply for AHCAL SiPMs



Main parameters

1	Maximum output power	0,6 W
2	Range of output voltage	+ (0 to 120) V
3	Precision of output voltage regulation	10 bit
4	Output voltages spread (channel from channel)	1%
5	Stability of an output voltages	0,01%
6	Temperature coefficient of an output voltage	100 ppm/K
7	Output voltage ripple and noise at full load	< 10 mV
8	Maximum output current	5 mA
9	Precision of current threshold regulation	10 bit
10	Precision of output voltage and current readout	12 bit
11	Time of quick-action of current limiting circuit	< 10 ms
12	Galvanic isolation	+/- 80 V
13	Temperature range	0 – 50 C
14	Humidity conditions	< 85 %

Galvanic isolation: (see circuit p.1)

1. Control line (I²C) - digital isolator based on a capacitive isolation barrier technique;
2. Transformer.

Galvanic isolation

Charge injection through insulating barrier.

1. Control line (I²C) isolator – $Q_i = \sim 1\text{pC}$
2. Commercial transformer $n = 1 : 1$
 - a) bifilar windings – $Q_i = 70\text{ pC}$
 - b) sectional windings – $Q_i = 10\text{ pC} \rightarrow 10\text{mV}@1\text{nF}$



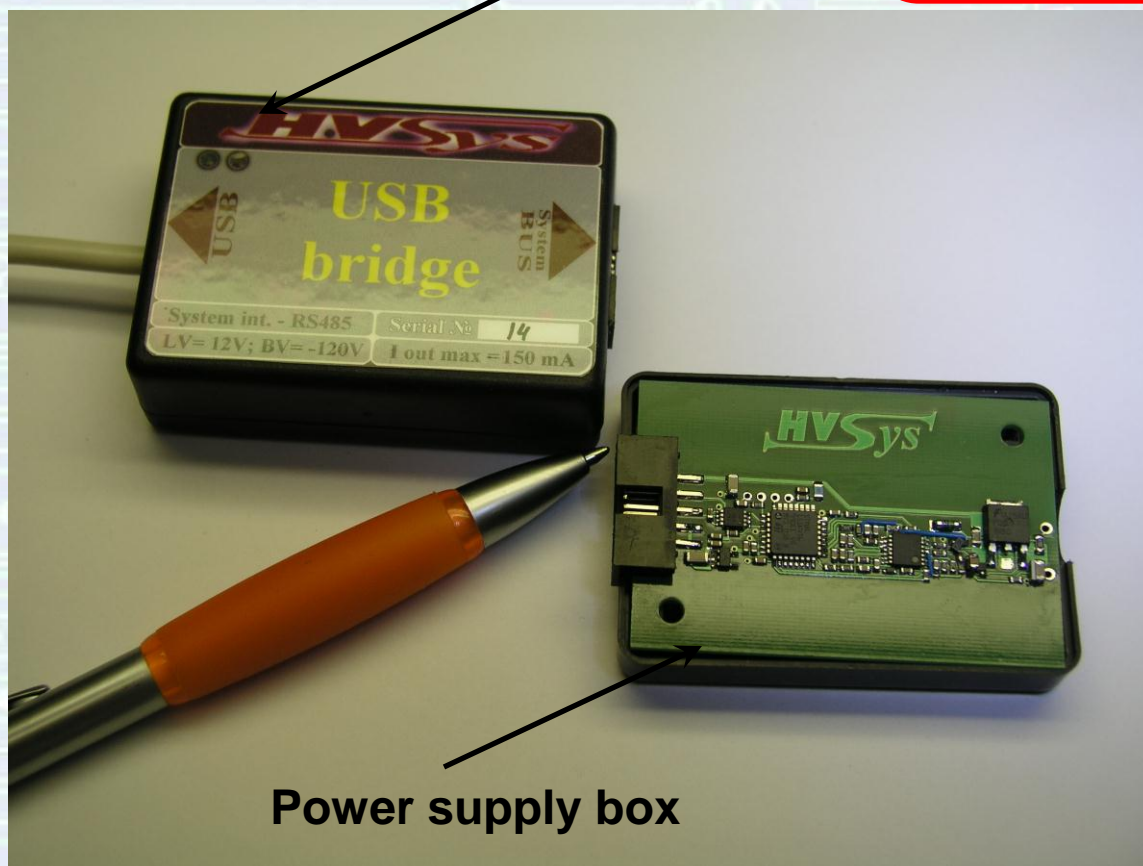
1. Midcom WURTH ELEKTRONIK p/n 40609R
4,7mH; 8,9x6,3x4,1mm
2. Midcom WURTH ELEKTRONIK p/n 40190R
3,1mH; 8,9x5,3x5,3mm



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Photo of pre-prototype
of one channel of isolated
power supply
for AHCAL SiPMs

Galvanic isolation box



Power supply box