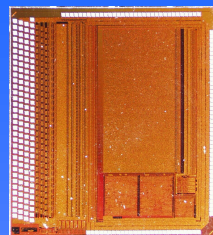


Beetle 1.0

First prototype of the radiation hard readout chip

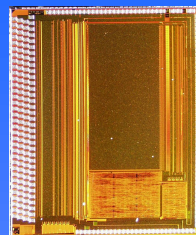
- 6.1 mm x 5.5 mm
- 128 analog channels
- 40 MHz sampling / readout
- I²C-Interface
- 10 bit bias generators



Beetle 1.1

Improved version of the first readout chip

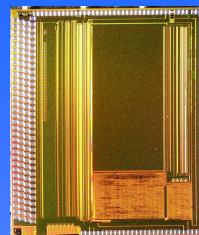
- 6.1 mm x 5.5 mm



Beetle 1.2

SEU robust digital logic

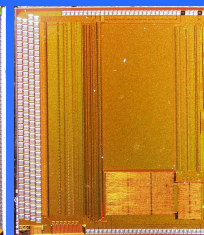
- 6.1 mm x 5.1 mm
- new analog front-end (FE 1.1)
- new digital logic (SR 1.0)
- all missing features now implemented



Beetle 1.2MA0

Readout chip for LHCb RICH detector

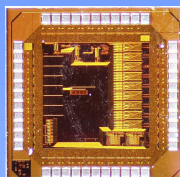
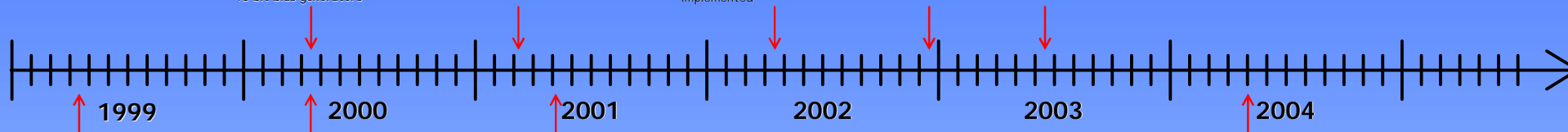
- 6.1 mm x 5.2 mm
- modified analog front-end for MA-PMTs



Beetle 1.3

Analog improved version of the Beetle 1.2 readout chip

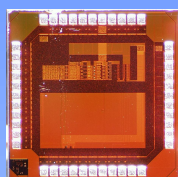
- 6.1 mm x 5.4 mm
- new power routing
- modified comparator
- new current output driver



BeetleBG 1.0

Bias generator test chip

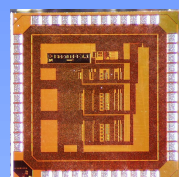
- 2.0 mm x 2.0 mm



BeetleCO 1.0

Comparator test chip

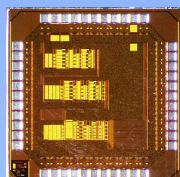
- 2.0 mm x 2.0 mm



BeetleFE 1.1

Front-end test chip

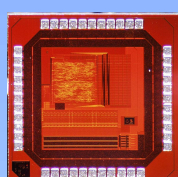
- 2.0 mm x 2.0 mm



BeetleFE 1.0

Front-end test chip

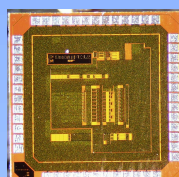
- 2.0 mm x 2.0 mm



BeetlePA 1.0

Pipeamp and I²C test chip

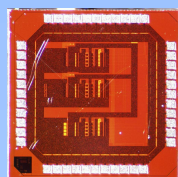
- 2.0 mm x 2.0 mm



BeetleFE 1.2

Front-end test chip

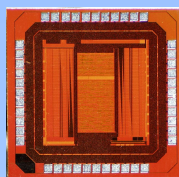
- 2.0 mm x 2.0 mm



BeetleMA 1.0

MA-PMT test chip

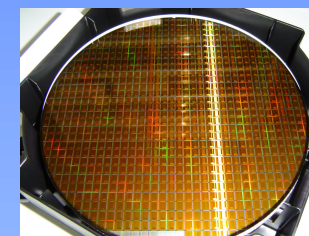
- 2.0 mm x 2.0 mm



BeetleSR 1.0

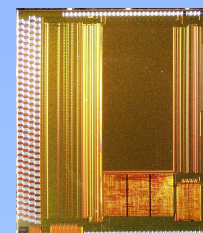
SEU robust I²C test chip

- 2.0 mm x 2.0 mm



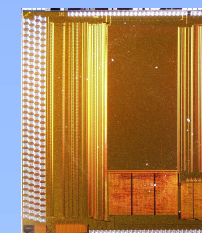
Beetle Engineering Run

Pre-Production Run with 3 different Beetle versions (1.3 / 1.4 / 1.5)



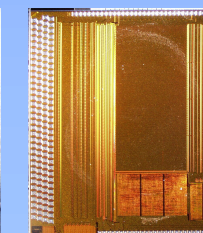
Beetle 1.3

- 6.1 mm x 5.4 mm
- no modifications (compared to previous submission)



Beetle 1.4

- 6.1 mm x 5.4 mm
- modified comparator
- modified analog routing



Beetle 1.5

- 6.1 mm x 5.4 mm
- changed power routing
- new pipeline cell
- modified pipeamp