

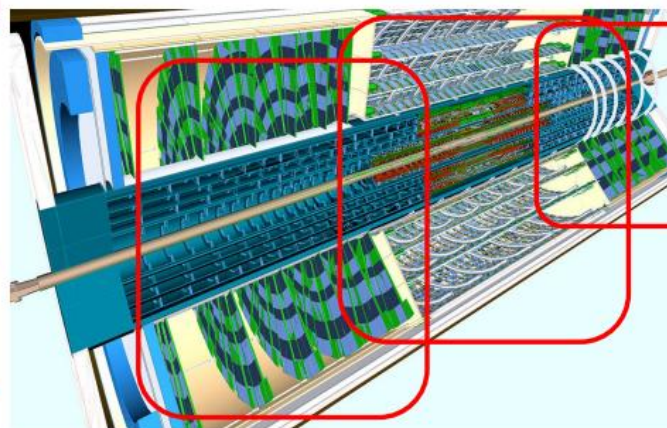
ATLAS Strip Detector で使われている BusTapeについての調査

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For the HL-LHC, the ATLAS tracking system will be replaced with all-silicon detector: **the Inner Tracker (ITk)**

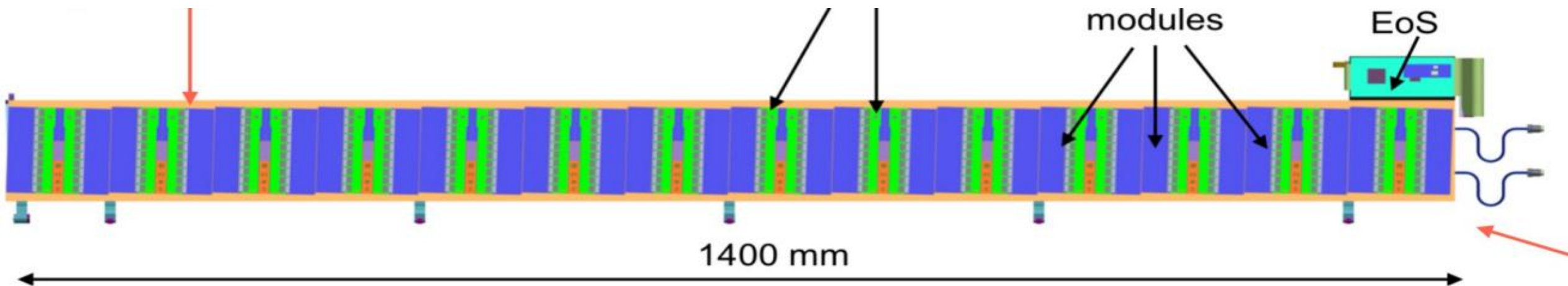
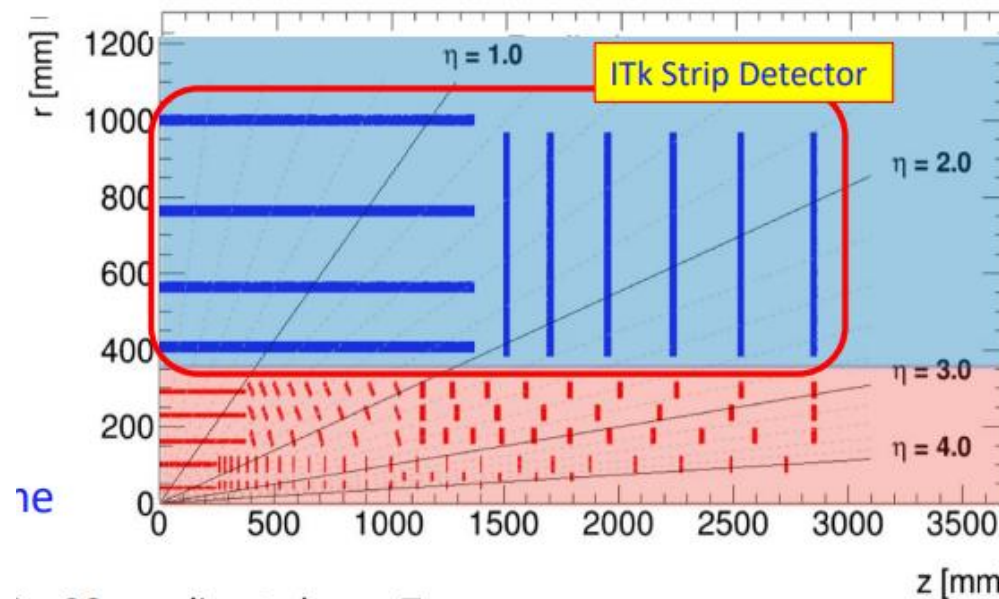
Geometry

- Pixel detector
 - Previous talk
- Strip detector
 - 4 concentric cylindrical layers in barrel
 - 6+6 disks in endcaps



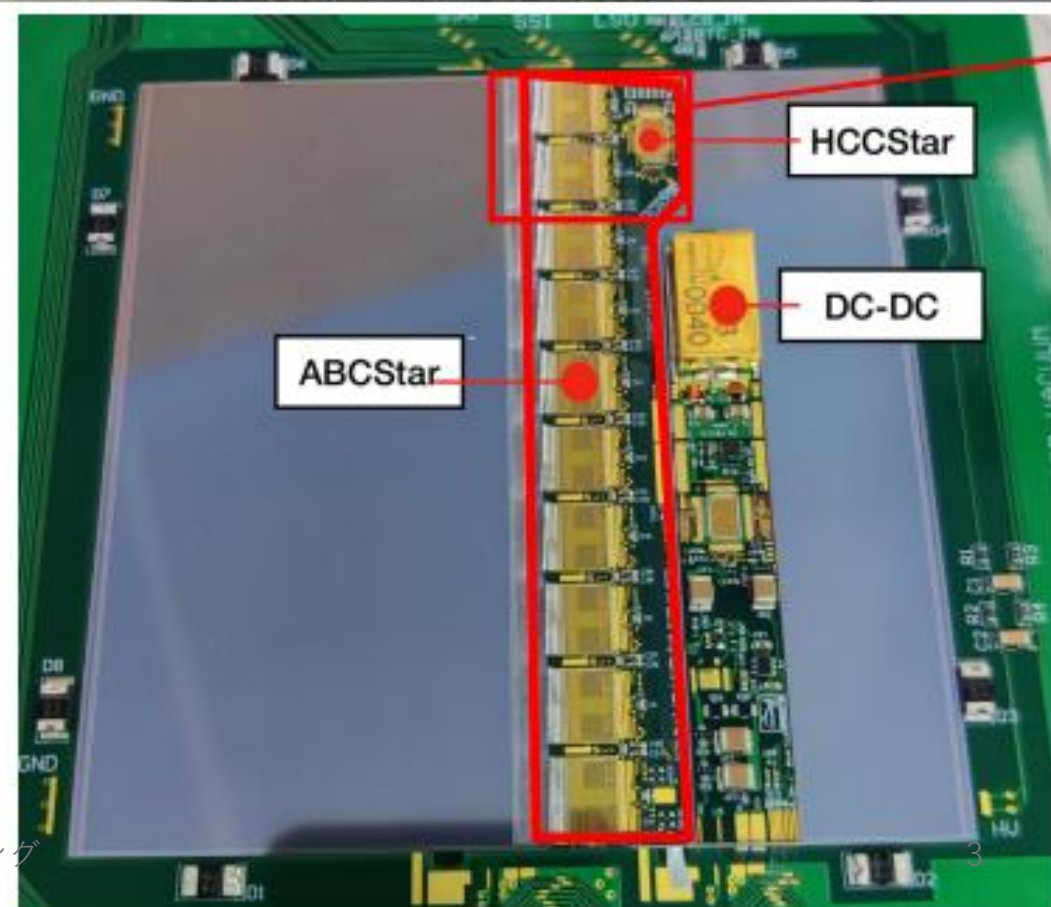
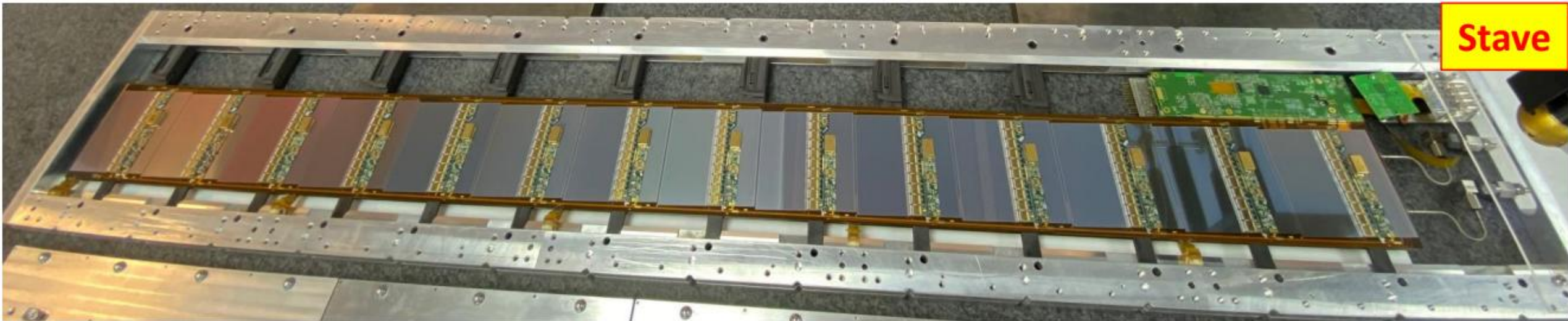
ITk detector designed to withstand harsh HL-LHC environment

- 4,000 fb⁻¹ over 10 years, $L_{\text{peak}} = 7.5 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$, $\mu \sim 200$, 1 MHz L0 trigger rate



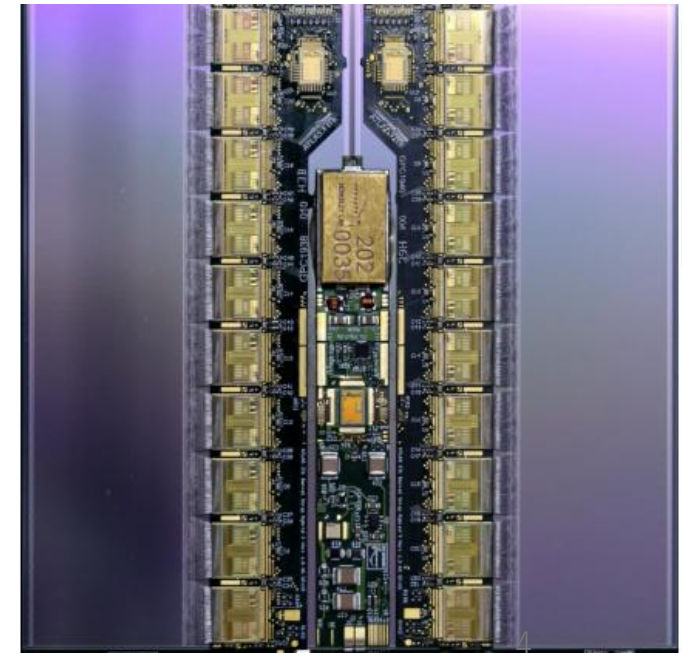
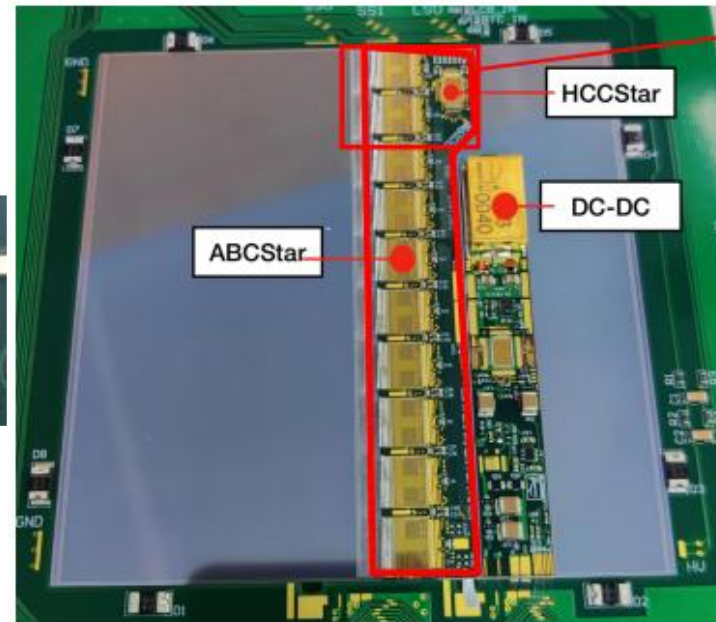
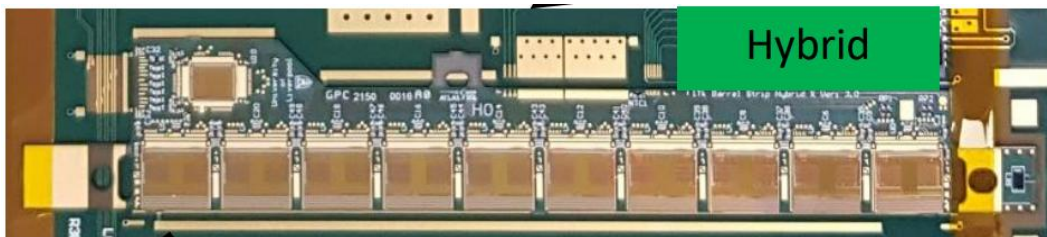
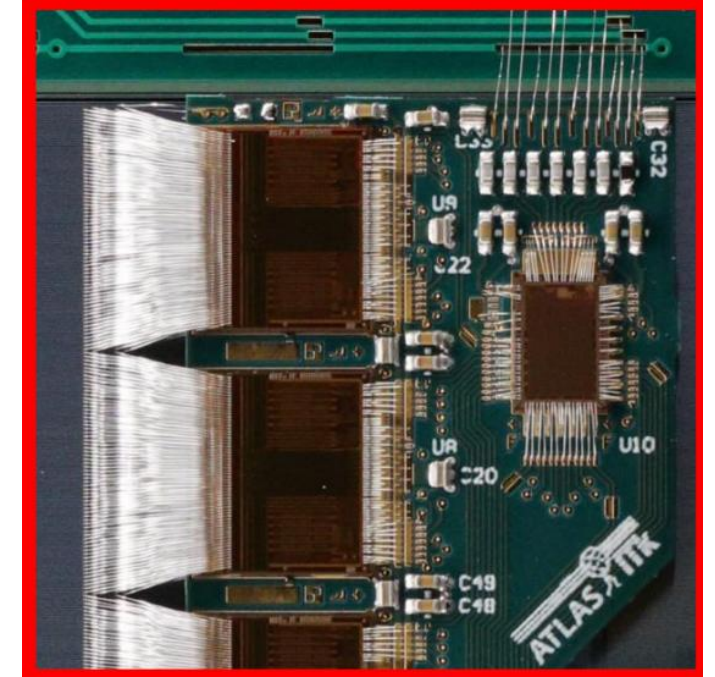
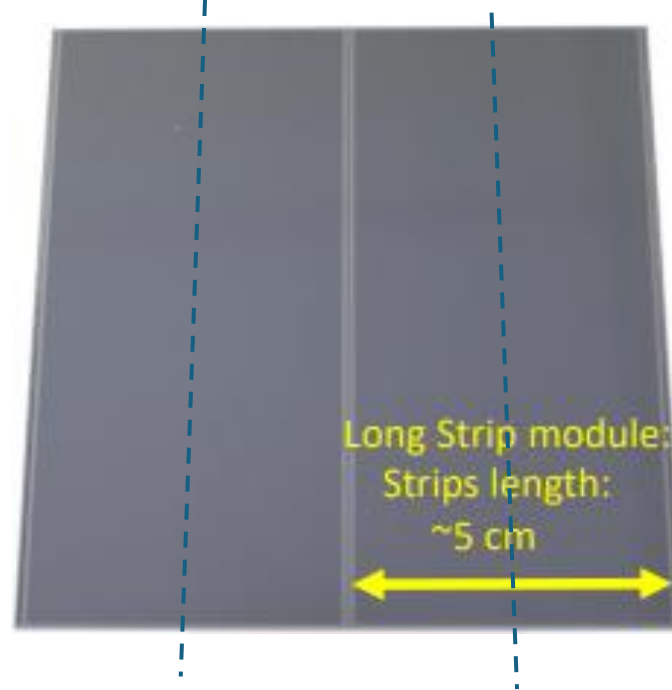
- $\pm 26 \text{ mrad}$ stereo angle in the front and back side

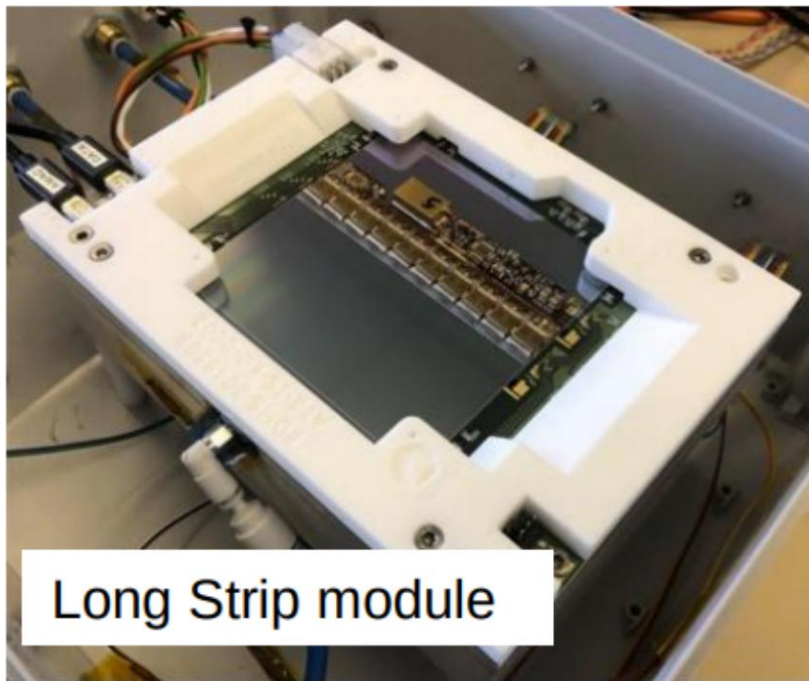
Stave



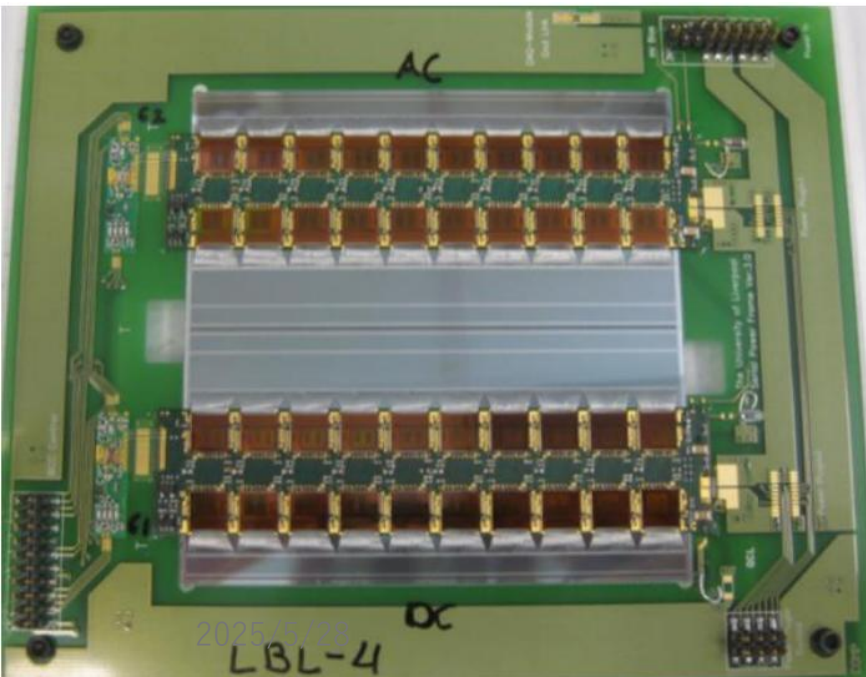
モジュール

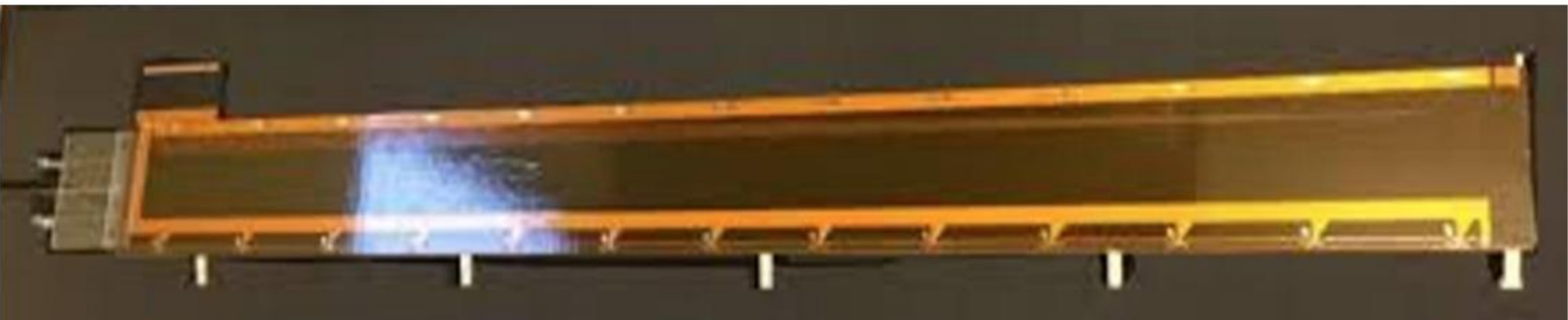
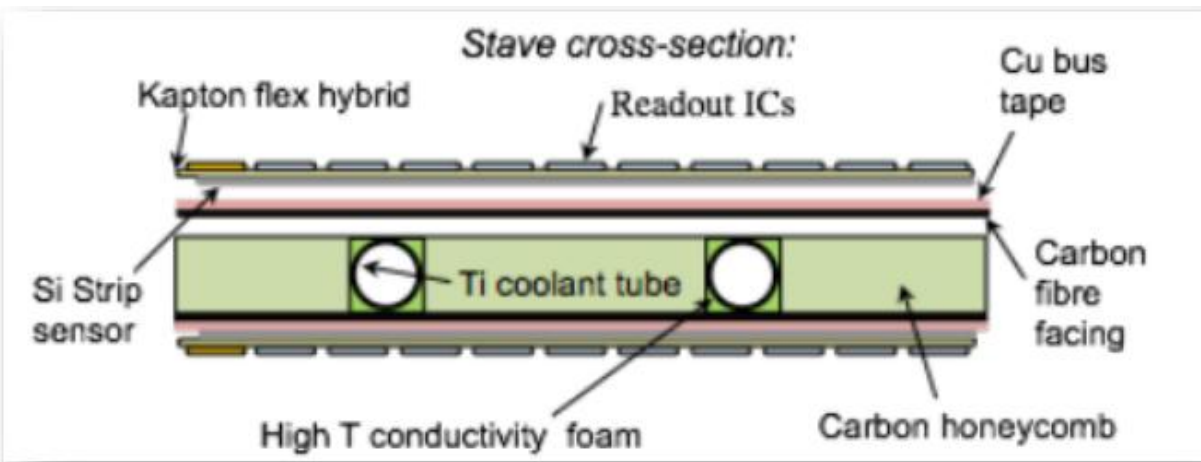
- Si Sensors by HPK
 - n + -on-p, 320 μ m thick
 - 9.7 X 9.7 cm²
 - Strip pitch: 75.5 μ m
 - Strip length : Long(5cm)/Short(2.5cm)
- 10 chips / sensor
 - 256ch / chip $\rightarrow$ 2560 ch
- センサーの上にASIC :
 - AC-LGADでは排熱できないかも

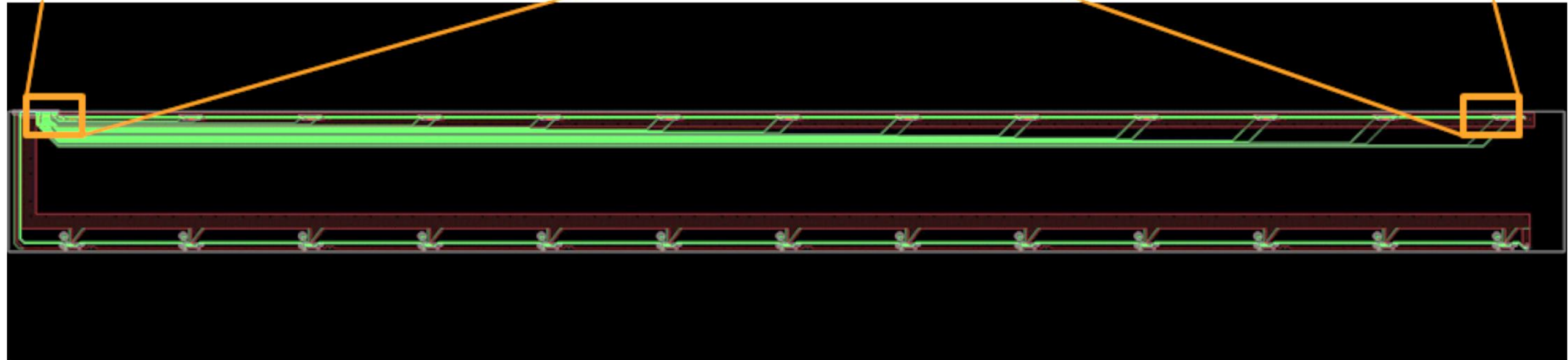
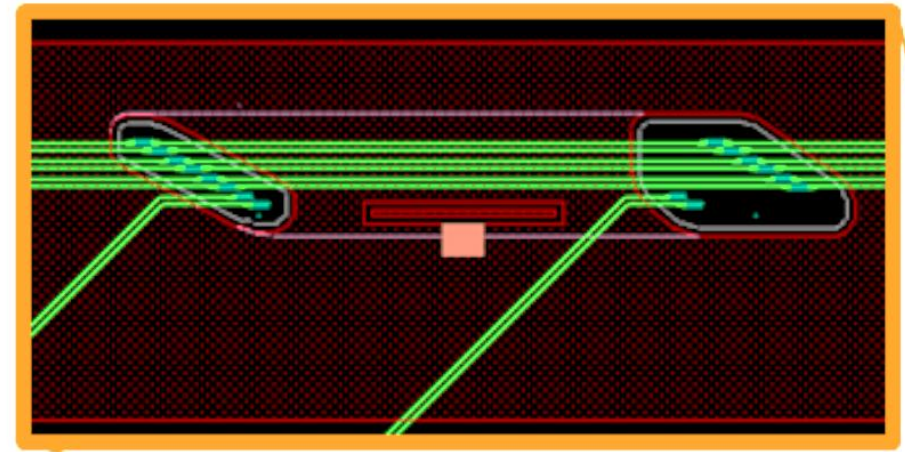
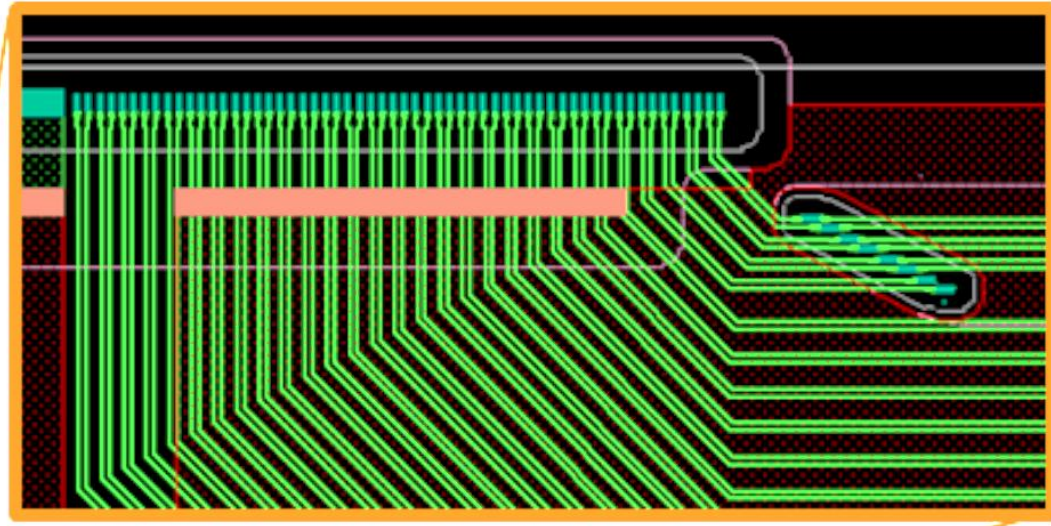




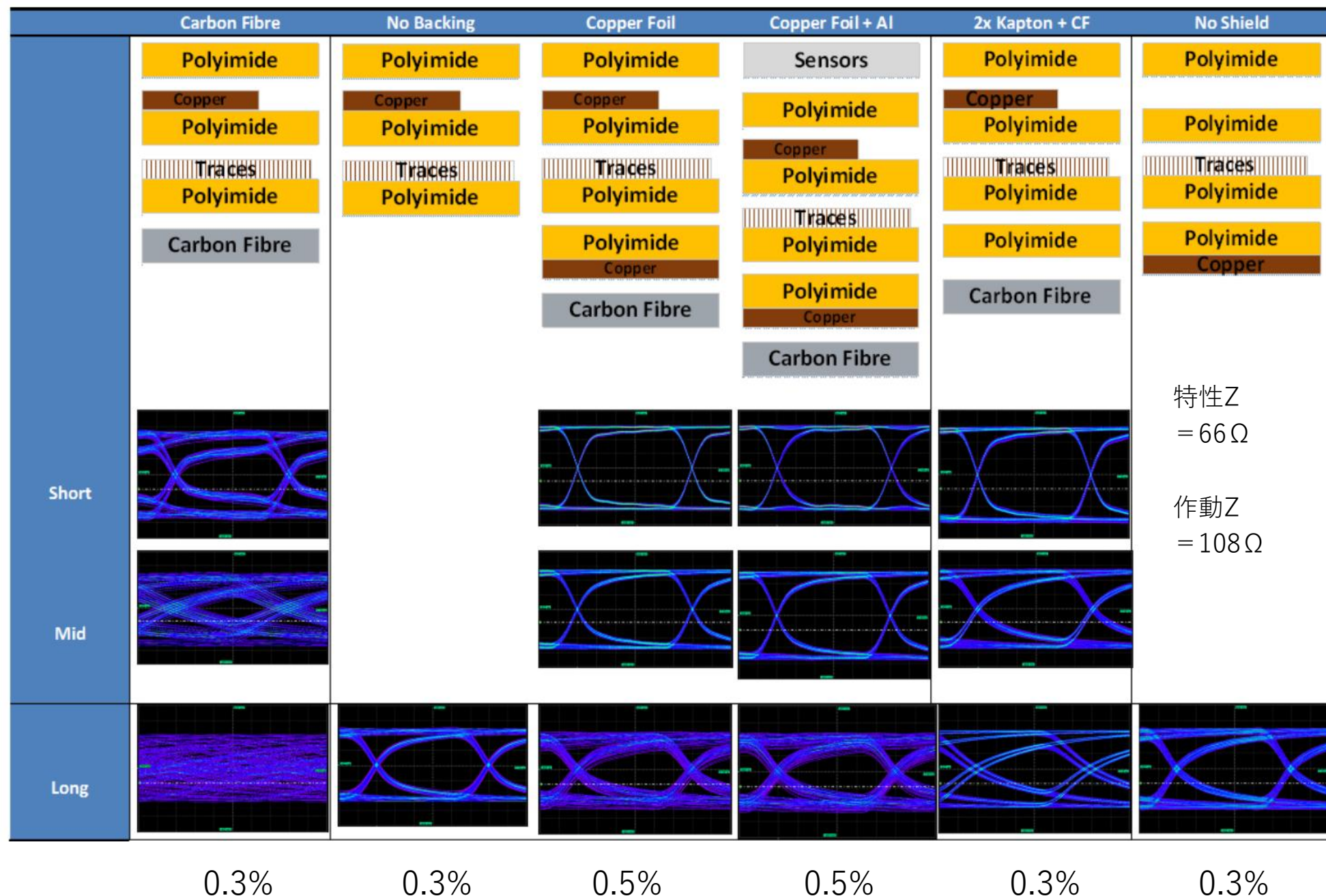
- The smallest building unit is the ITk strip detector module. ... The modules are glued onto the support structures with integrated services and cooling.
- An ITk strip module is built from **a silicon sensor** and **flexible printed circuit boards called hybrids**, as well as **powerboards** which are glued directly onto the sensor.







- Original layout of the bus tape for the barrel silicon strip detector. Tape is 1.2 m long. The top 3 pairs of lines on the tape are multi-drop clock and command lines. The rest of the lines on the top half are point-to-point data lines. The lower half of the tape is for power distribution. Shield layers are not shown



Cu:18um (0.13%)
 PI:25um (0.01%)
 Glue:25um (PIと同じ)
 L/S = 100um

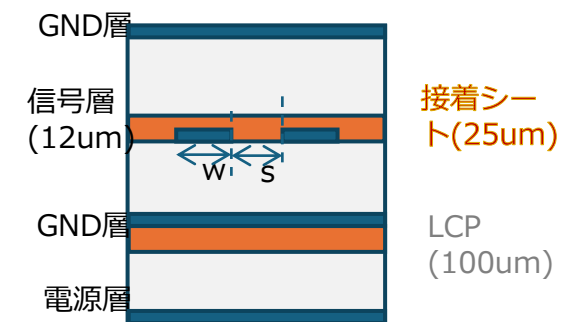
物質量少ない理由

- ・ マイクロストリップ構造
 - ・ 電源、GND層で挟んでいない
- ・ スルーホールがないのでメッキしていない

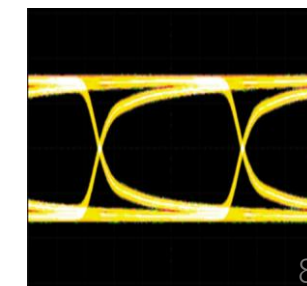
特性Z
 = 66 Ω

作動Z
 = 108 Ω

INTT BEX



4層は接着剤によって張り合わせている



特性Z
 = 47 Ω

作動Z
 = 93 Ω

130cm BEX + FPC(20cm)

Lessons learned in high frequency data transmission design: ATLAS strips bus tape
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10F-Jミーティング

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