



Flex Status for Outer Layers

Richard Plackett on behalf
of the Oxford Group

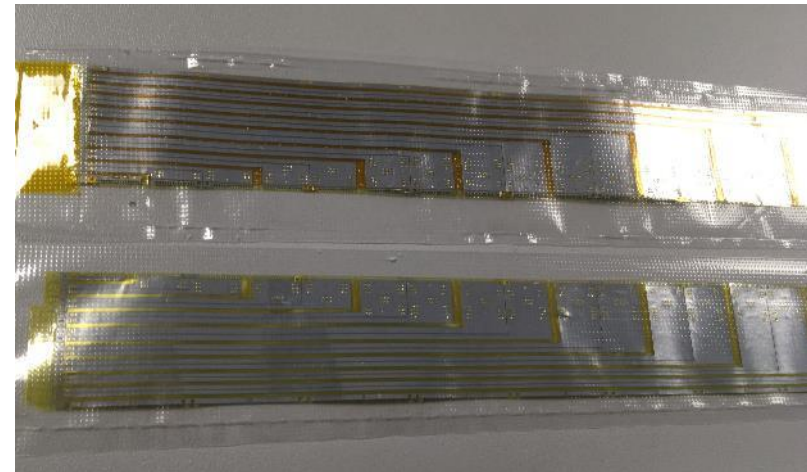
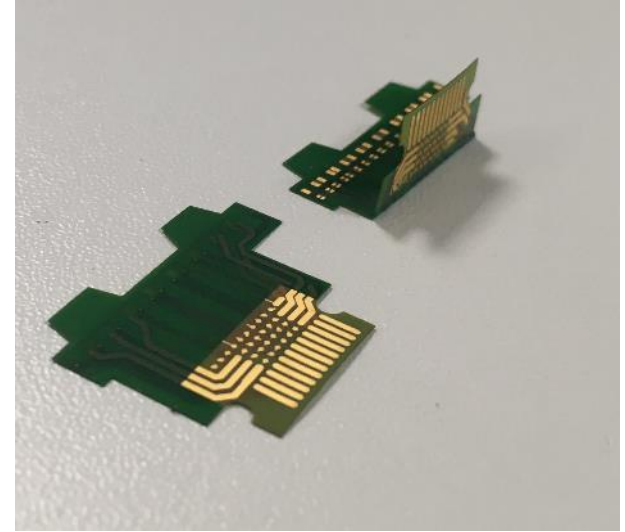


List of Existing Flexes...



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- Tape heater flexes (L3 and L4) - work complete
- Fake Ladder Flexes: (L4) mechanical practice parts no aluminium
 - for learning how to glue chips and interposer flexes
 - Debugging tooling
 - Same geometry as the SI heater flexes
- Si Heater Ladder flexes: (L4) made by LTU quite a long time ago now, we have X in stock and two more mechanical practice parts
 - Individual Si heater powering and resistor readback
- Si Heater interposer flexes: SwissPCB 4 layer copper flexes to make the 90degree bend 60 in stock
- End piece Si heater flexes: connects to interposer flex – four ladders per flex. Very dense routing geometry...



ILLV MEA

List of Future Flexes



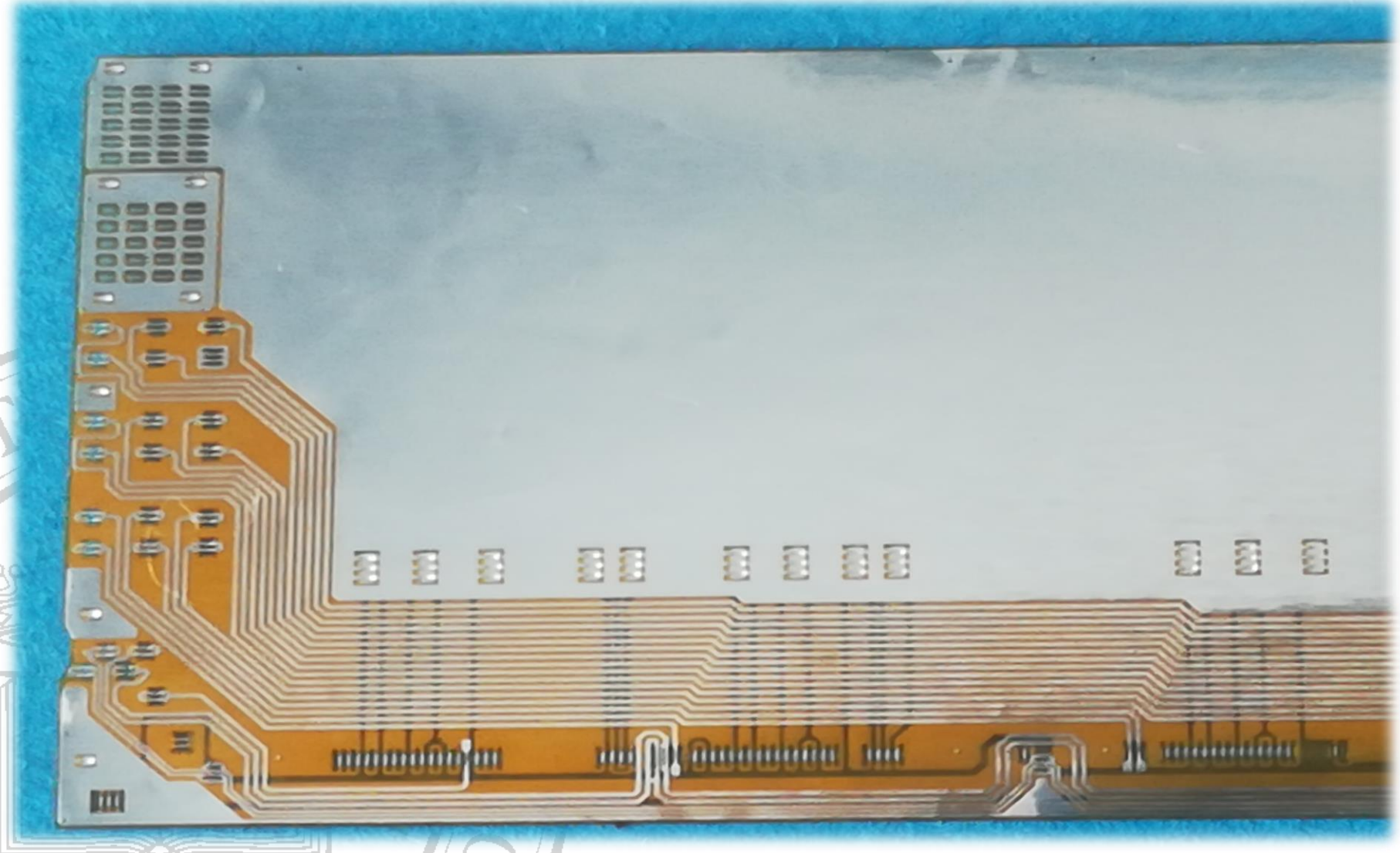
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- Mupix10 Ladder Flex (L4)
 - In production by LTU (see next few slides)
 - Can configure but not read back all chips
 - Different geometry from Si heaters due to chip size difference
 - Designed to make design changes to final as small as possible
- Final + Mupix10 interposer flex (US & DS)
 - Designed as for Swiss PCB process but manufacture not yet launched
 - Same design for Mupix10 and final
- Final Ladder Flex (L4 & L3)
 - Waiting for experience from Mupix10 work to sign off design
 - (hopefully) very few changes from precursor
- Electrical 'end piece flex' (L4 & L3 X US, &, DS)
 - Not yet designed, or allocated.
 - Si Heater version had worryingly high track density for space available, may need to be six layers
 - Four distinct flexes needed due to handiness and layers even if electrically all very similar

Mupix10 ladder flexes



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Mupix10 Ladder Genesis



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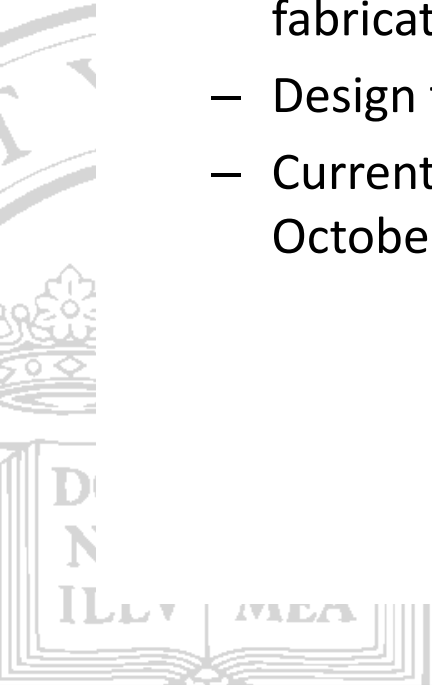
- During flex design a Mupix10 a bug was discovered that made it definitely not the final chip. Essentially we can't configure the chips via the bus, need to address individually
- We added this intermediate ladder design to the program on condition it was incredibly similar to final one.
 - Same interposer and end piece flexes
 - Same tab bonding at the ends
 - Only L4
 - No Major rerouting required
- Concept: we reused half the data links as the 'new' chip select lines
- Very useful as a development step but:
 - Couldn't have full number of config and data lines without the design diverging too much from baseline
 - Can only read back every other chip, but can program all for power consumption and crosstalk tests

Mupix10 Ladder Flex Status



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- Note: these are very long flexes ($\sim 40\text{cm}$) for this technology so we are (as ever) pushing the envelope of what's possible
- Report in September from LTU:
 - Mechanical Technology demonstrators competed – parts exist, fabrication possible.
 - Design tweaks for manufacturability completed
 - Currently working on 8 prototype ladders which should be complete in October.



Designs for Final Ladder Flexes



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Discussion:

- Revert data readback and config bus correctly
- Tweaks to match final chips pad positions (hopefully none)
- HV bond position (after testing)
- Power balancing 'cuts' in the power planes as suggested by Andre (not implemented in this due to design time)
- QC test pads?



Conclusions



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- Mupix10 ladder flexes well advanced
- Deliberately little work to go to final ladder flex design – waiting for lessons from Mupix10 ladders
- End piece flex design still unallocated

