



EMCM4 test results

Belle II PXD EVO meeting

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for the MPP/HLL team





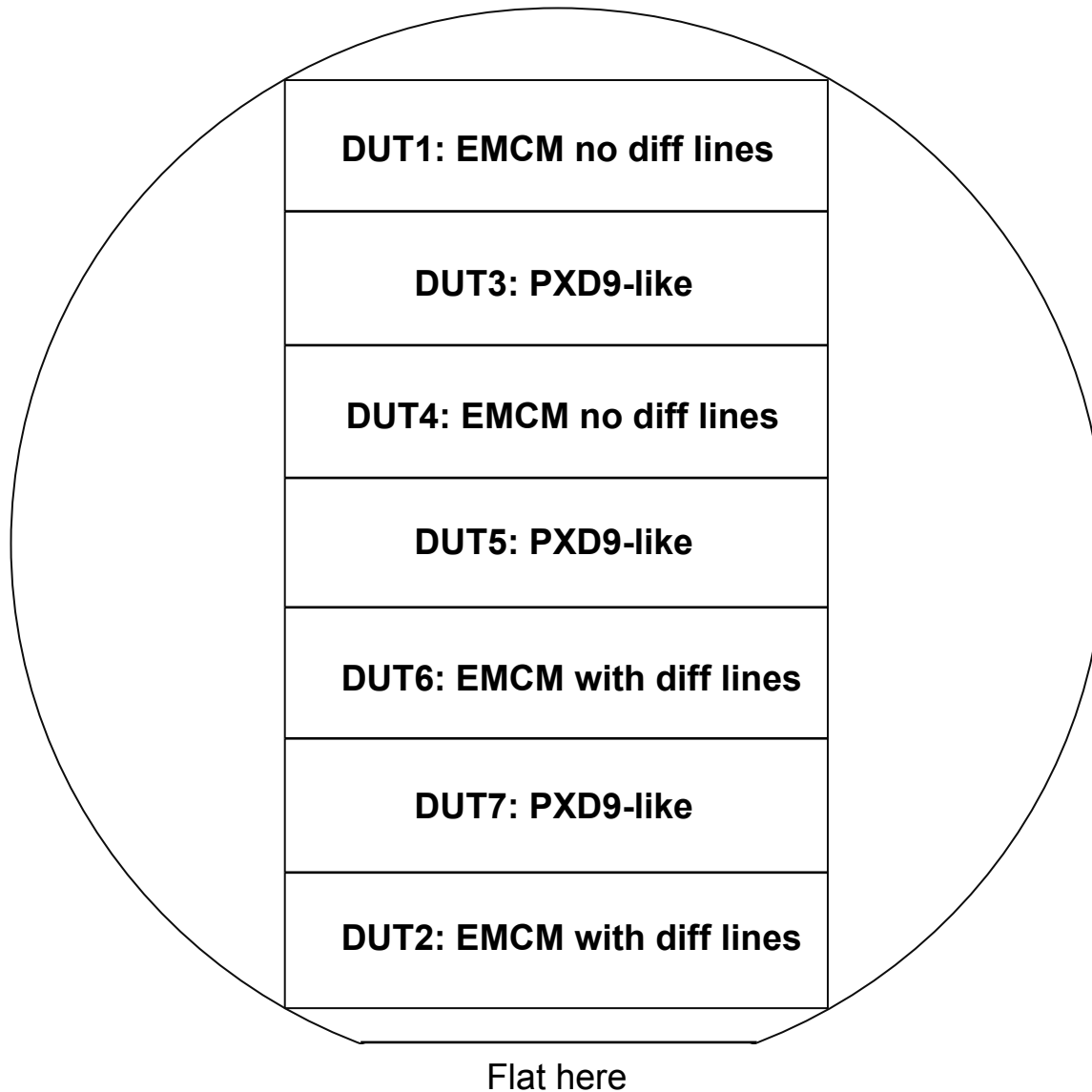
Outline



- Wafer layout
- Test results
- EMCM4 yield
- Fault description
- Conclusions



Wafers layout



W	Type
24	SOI
25	standard
26	standard
27	standard
28	standard



Test results



W	DUT1	DUT2	DUT3	DUT4	DUT5	DUT6	DUT7
24	0	1*	0	0	2	0	0
25	1,1†	0	1†	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	1	0	0
28	0	3†	0	0	0	0	0

- * High-Ohmic shorts that do not affect the functioning of the module.
- † Low-ohmic short that does not affect the functioning of the module.
- In **red**, lethal shorts.



Rainer's yield criteria

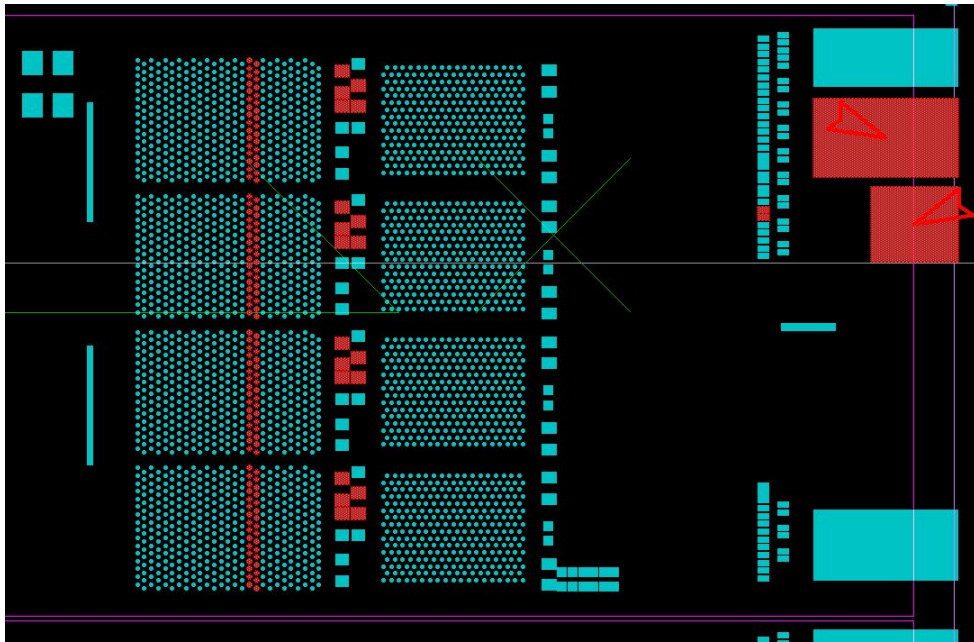
- 0** – no severe defects
- 1** – single pixels
- 2** – single rows and columns
- 3** – whole module affected
- 4** – whole module killed
- 5** – to be clarified

W	DUT1	DUT2	DUT3	DUT4	DUT5	DUT6	DUT7
24	0	0	0	0	4	0	0
25	4	0	2	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	4	0	0
28	0	2	0	0	0	0	0

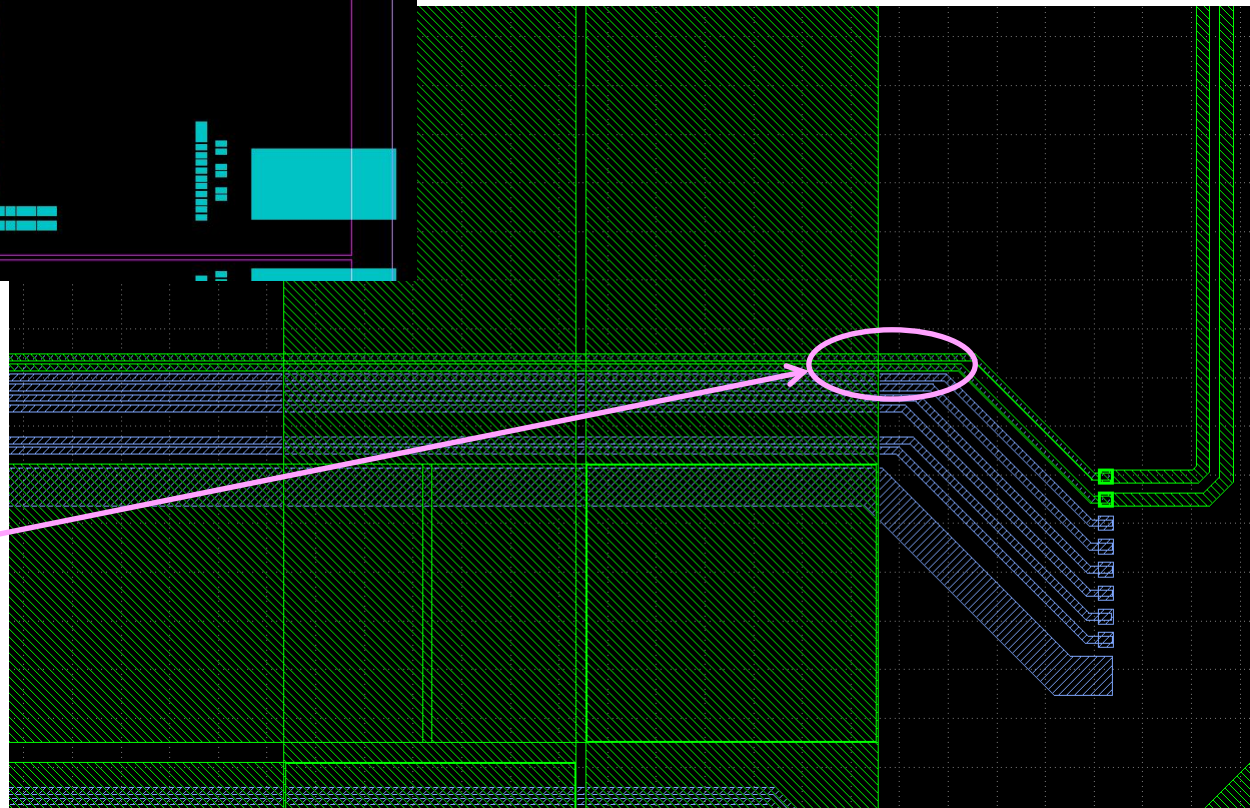
Yield = 91.4%



W24 – DUT5 (grade 4)



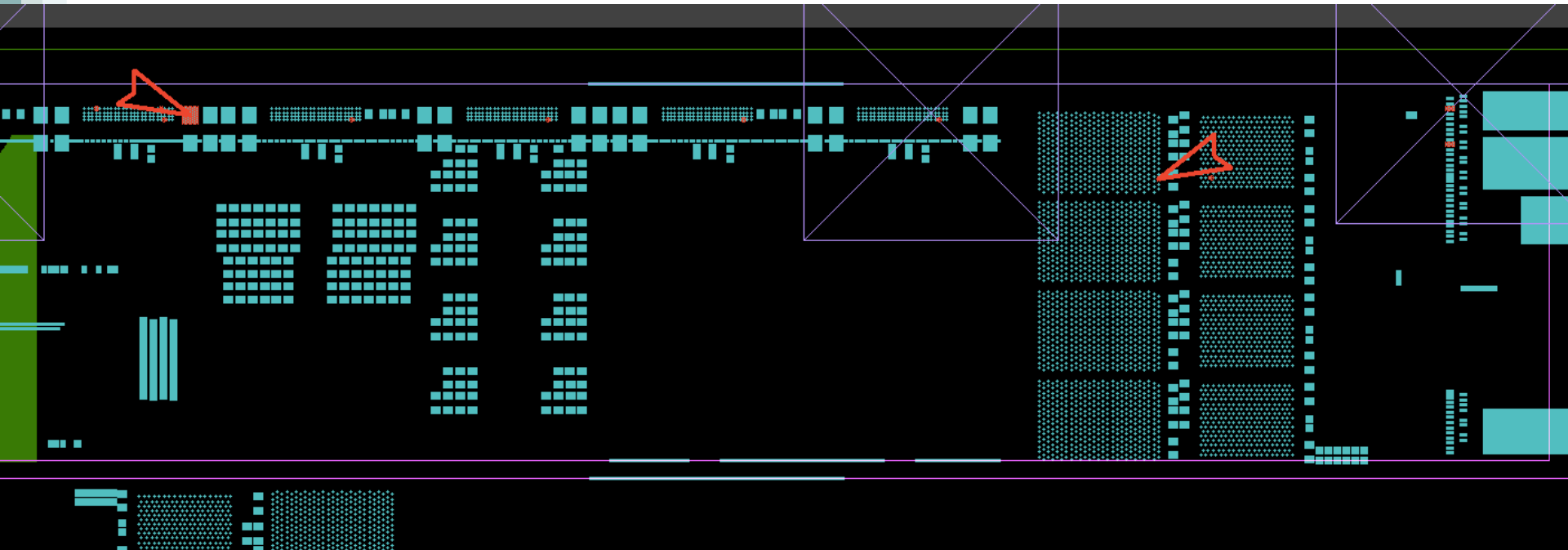
Short between analog ground and analog supply voltage.



Possible stringers between same metal lines.



W25 – DUT1 (grade 4)



Short between TMS and GateON.



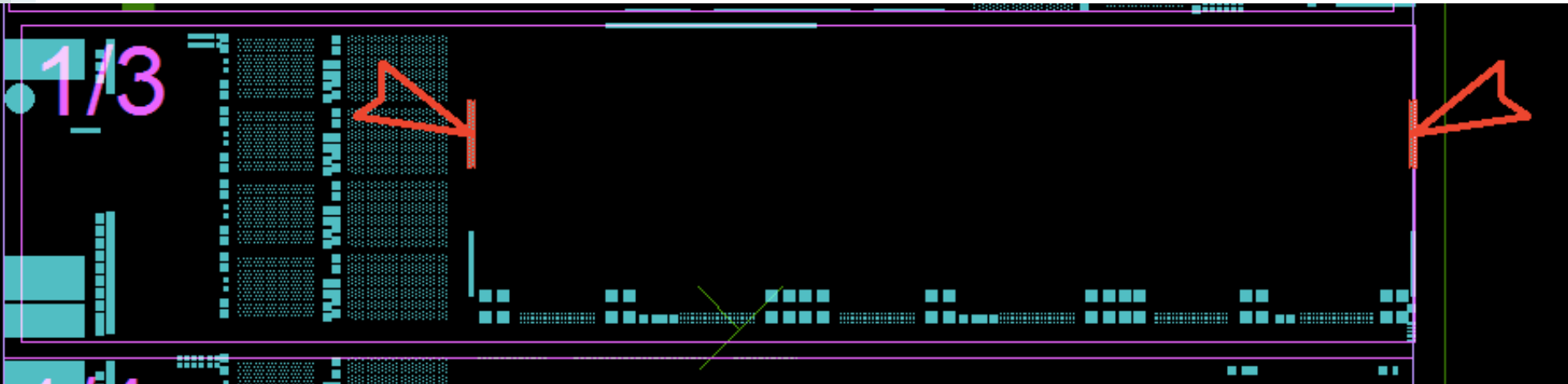
W27 – DUT5 (grade 4)



Shorts among drain lines and source pads.



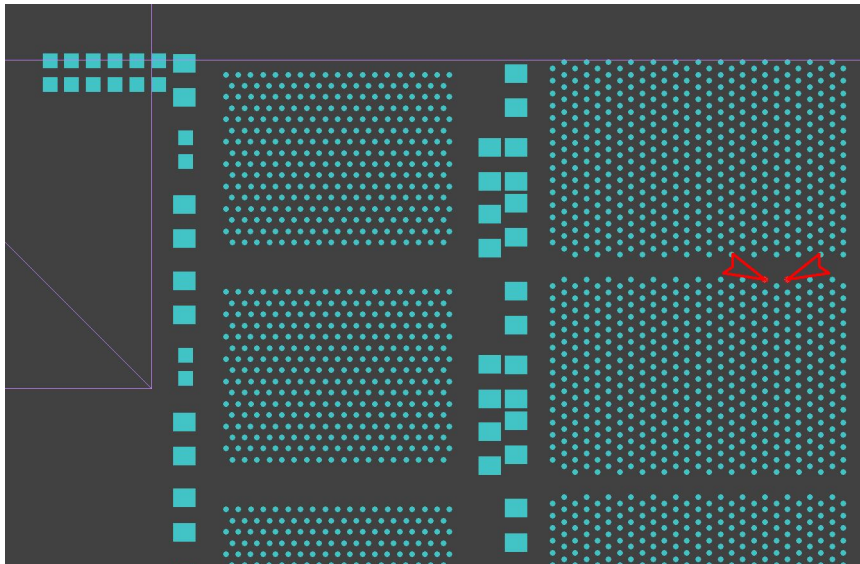
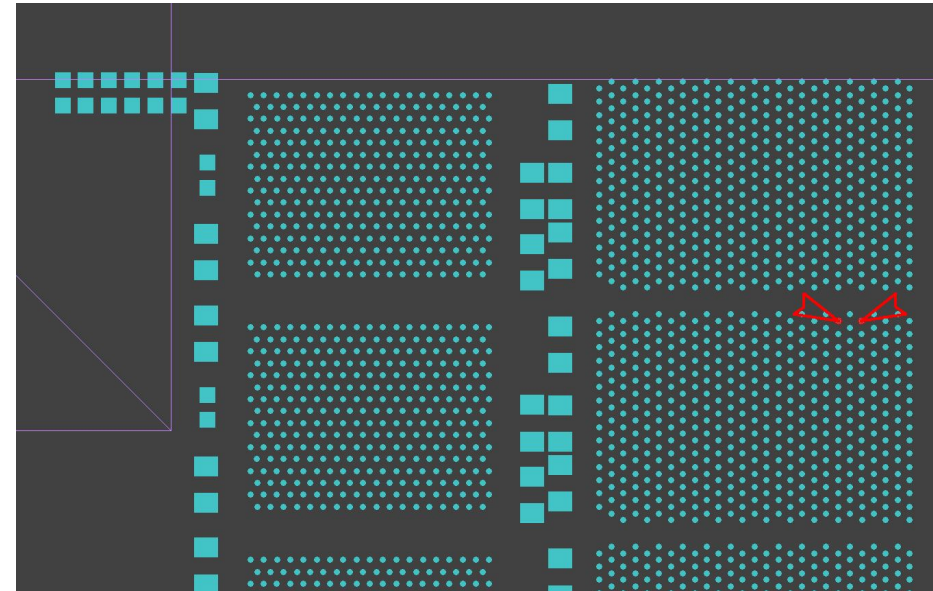
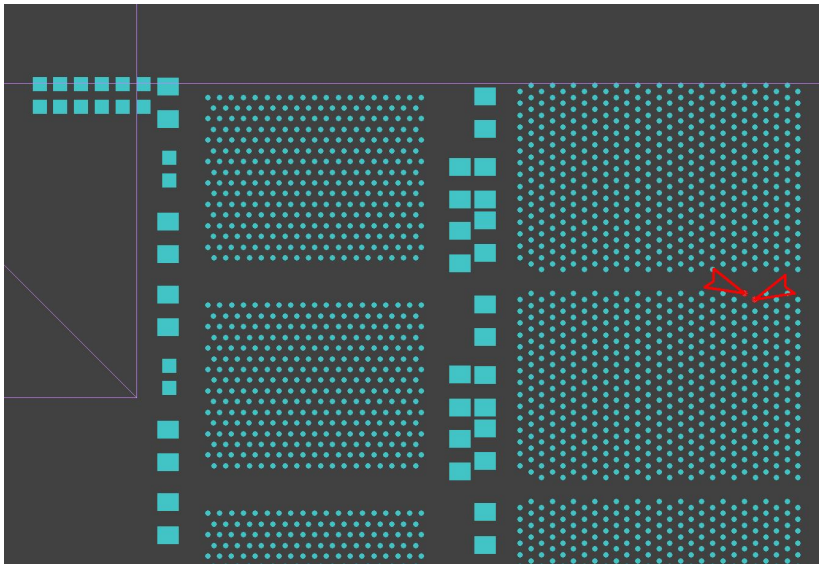
W25 – DUT3 (grade 2)



Lateral shorts in Al2 drain lines (converted to a comb structure for test purposes).



W28 – DUT2 (grade 2)



- Lateral shorts in AI2.
- It was not possible to identify them with optical inspection.
- They are not critical for the functioning of the module.



Conclusions



- Three lethal shorts found in power nets out of 35 modules (DUT5/24, DUT1/25, DUT5/27).
- DUT3/W25 and DUT2/W28 (in general, grade 2 faults) could be repaired.
- The technology of choice for the PXD9 production proves to be **stable and reliable, with a high yield (91.4%)**.
- All PXD9 wafers will be tested after Al1 as well as after Al2 → **possibility of rework on the same metal layer**.

Thank you for your attention!