Flip Chip and SMD

overview and test results







PXD6: DCDV2, DHP0.2, 4 Switcher B18V2



EMCM: 1 DCDV2, 1 DHP0.2, 6 Switcher B18V1

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Flip Chip of ASICs:

- \triangleright No major issues reported
- Initial problems with SWB bumping seem to be resolved All SWB screened at HLL before shipment to IZM







- → DCD: 10,31 kg \rightarrow 415 bumps \rightarrow 25 g/bump (UBM shear on DCD mostly) → SWB: 1.3 kg \rightarrow 100 bumps \rightarrow 13 g/bump (solder shear)
- \rightarrow 01005: 267g, 230g (bcb shear), mean 250g (two solder shear, one BCB) $\rightarrow \sim 5 \text{mg}/\mu\text{m}^2$





 $\rightarrow \sim 4 mg/\mu m^2$

DHP and DCD lands on EMCM after shear















▷ Recent SMD job at Finetech not very successful!!

- \mapsto Obvious shorts on W9-1 DHP control termination resistors \rightarrow lethal
- → Small short on W9-2 → DCD Vrefin shorted to GNDA



:- Solder paste dispense needs better control :- finetech is not a solution for production!







Assembly of bumped chips to bump adapters ("our copper")

- \triangleright DHP to adapter at Bonn \rightarrow no issues reported, routine??
- \triangleright DCDPipe and DCDRO for Hybrid 4 testing \rightarrow issues seen at Mannheim



DCDRO ad SWB bumps: SAC305 on Au studs





SWB bumping on chip level \rightarrow PacTech



- ▷ UBM ENIG (Electroless Nickel Immersion Gold)
 - └→ Chips face up glued to tape, "re-assemble" wafer, no req. on placement accuracy
 - → Bath 1: "zincation", replace upper layer of Alu pad with reactive Zinc
 - \rightarrow Bath 2: electroless depositon of Nickel on Alu pad with Zinc layer (~5 µm)
 - \mapsto Electroless depositon of Gold, ~ 50nm
 - → Price tag: setup 4500 € per chip type, 20 .. 30 €/chip (depending on number of chips)



SWB bumping on chip level \rightarrow PacTech

- ▷ Single Chip Solder Balling SB² (similar to Mannheim but now on ENIG, not Au Stud)
 - \rightarrow 80 µm SAC305 balls
 - → Already experience with PacTech service for HLL dummy ASIC production (DCD, SWB..)
 - \rightarrow Still ball-by-ball single chip process but now out-sourced and on their own UBM
 - → Price tag: 2800 € setup per chip type, 16 .. 26 €/chip





Image of PacTech's SB² tool dropping and laser reflowing a solder sphere.

Solder Placement with Laser Reflow (SB²-SM):

:- technical details clarified

- :- quotation (test and final run) exist
- :- start with 10 + 20 SWB18 1.0 to test service and quality!













- ▷ FC to "our copper" is routine by now (if bumping is okay ..)
- ▷ SMD remains to be an issue, needs careful process control and monitoring
- \triangleright PacTech agrees to bump SWB on chip level
 - \mapsto quality to be proven
 - \mapsto test run to be scheduled
- \triangleright First qualification results of FC and SMD done
 - \rightarrow good results so far
 - \mapsto need to be repeated after temp. cycling
- ▷ Rework (ASICs and SMD) left out so far
 - \mapsto first we have to assemble ...
 - \mapsto rework test has to be addressed soon!

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