FINELINE

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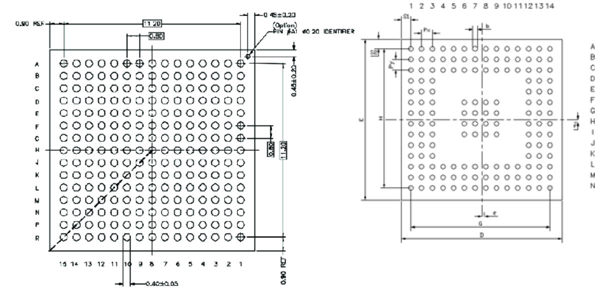
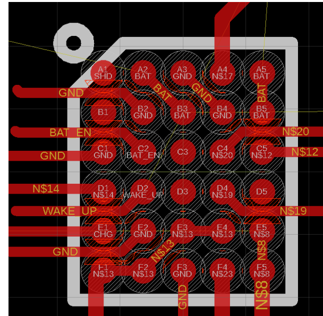
Design recommendations for 0.4 mm pitch BGA

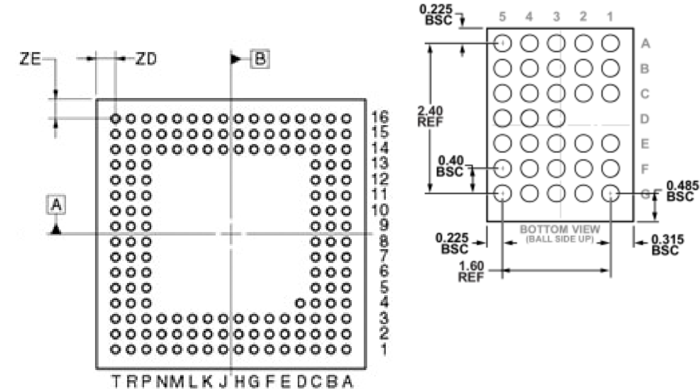
0.4 mm pitch BGA component

- Different 0.4 mm pitch footprints
- Design rules are the same for all footprints
- Stacked via is needed to fan-out each BGA row
- Number of BGA rows determin the level of stacked via
- “ELIC”(Every Layer Inter Connect) necesarry >10 rows



Stacked via with ELIC technology





Via constructions

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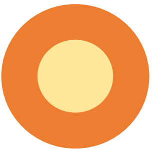
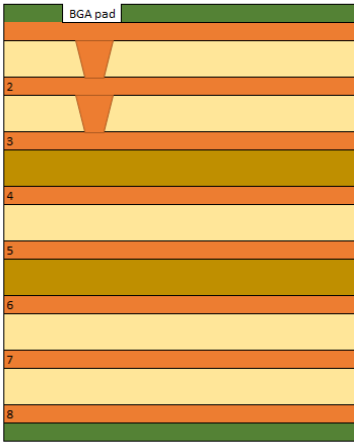
- Stacked via in pad
- Stacking vias and via in pad gives more design freedom
  - Vias will be filled and capped with copper(IPC 4761 Type VII)
- Fan-out each BGA row on individual layer

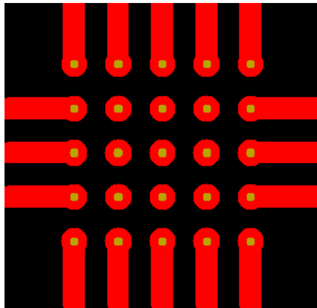
Stacked via

Via in pad

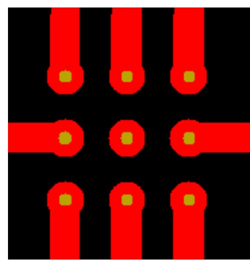




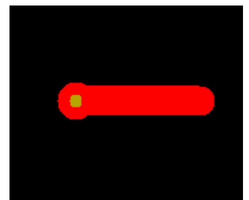
Row 1 fan-out on layer 1



Row 2 fan-out on layer 2



Row 3 fan-out on layer 3



Stack-up configurations

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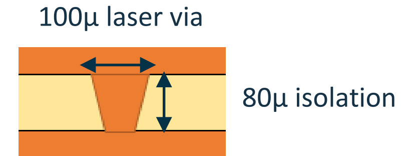
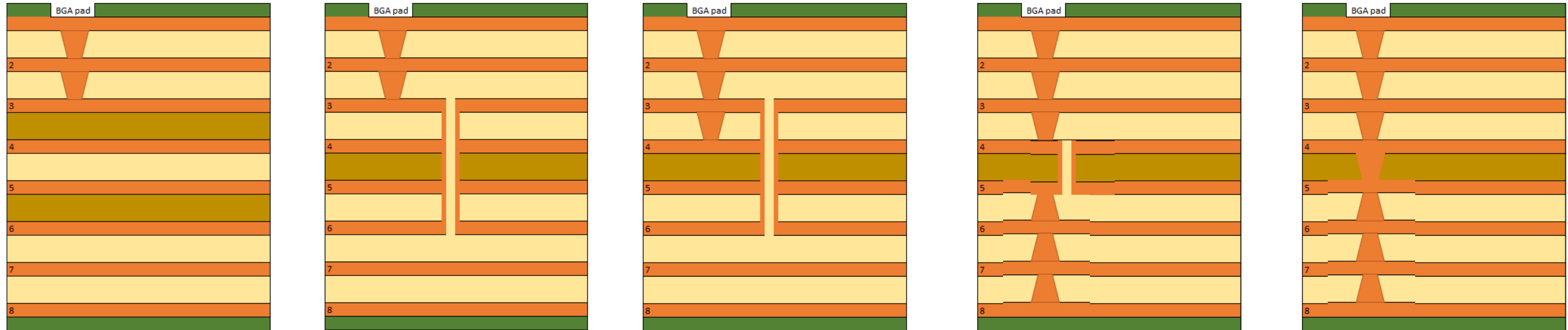
- Important to keep construction symmetrical
- Aspect ratio of blind via max. 1:1 (preferred 1:0,8)
  - e.g. 100µ hole, 100µ(80µ) isolation between layer





ELIC (Any layer technology)

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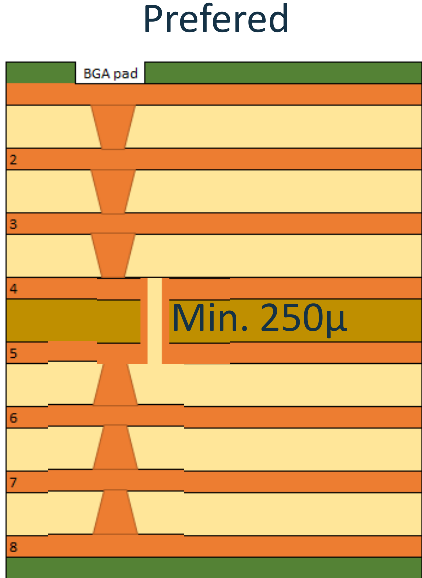
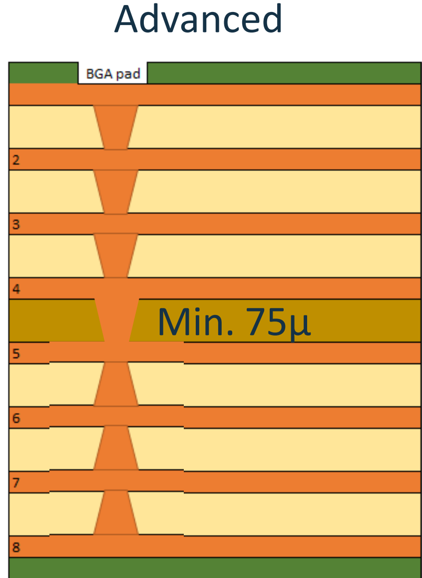
- ELIC (Every layer Inter Connect)
  - Connection with any layer pair possible
    - E.g. 1-3, 2-7, 1-6, 5-8, etc. etc.
- Two options for middle core
  - With buried via resin filled (prefered)
    - Minimum core thickness 250µ
  - With buried via Cu filled (advanced)
    - Core 75µ

Prefered



Advanced



ELIC (Any layer technology)

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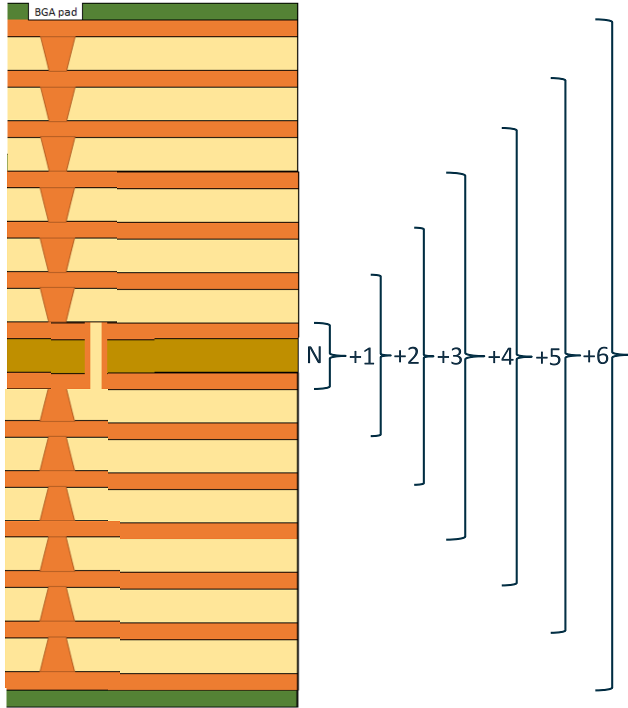
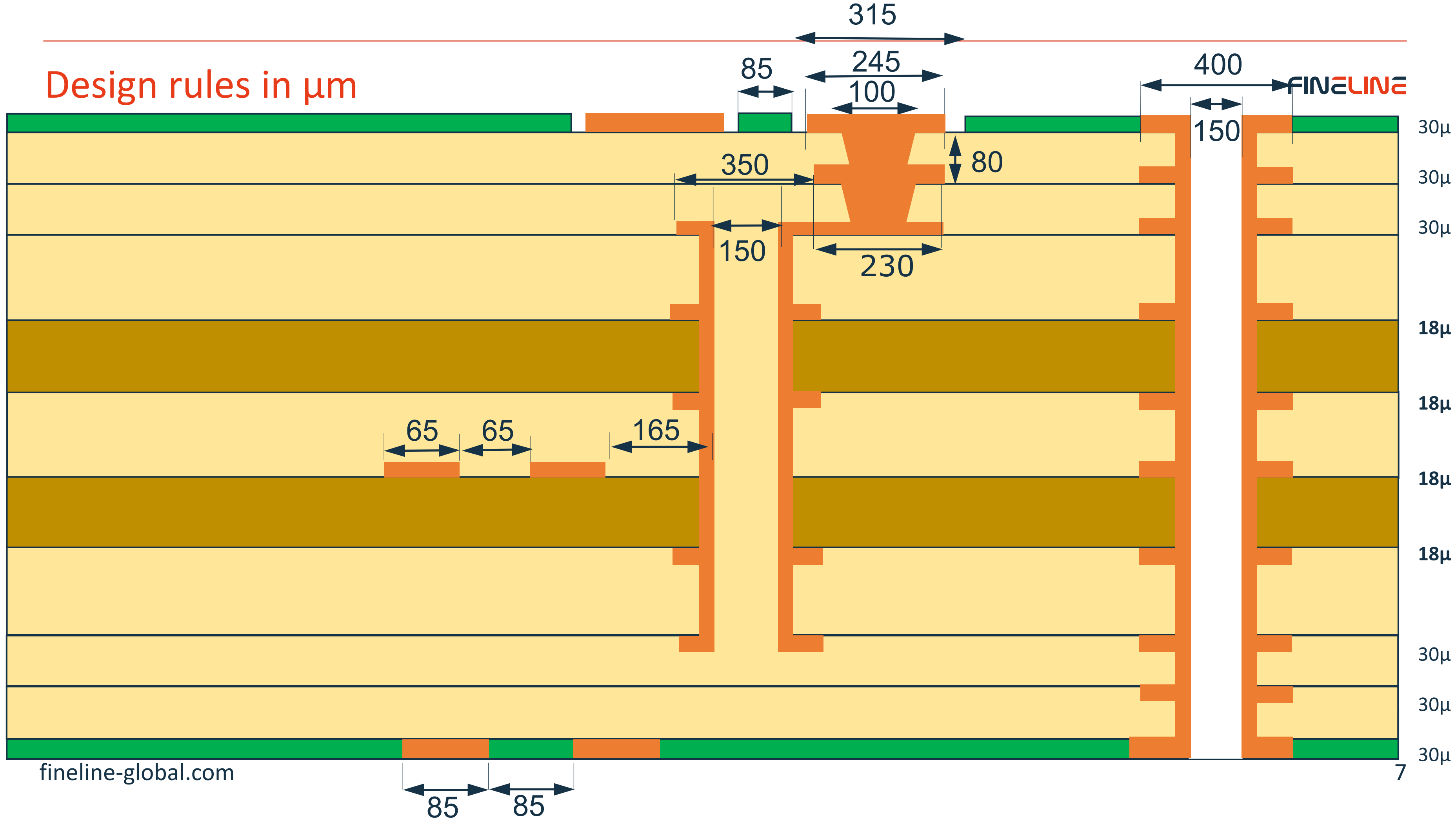
- Maximum number of stacked via is 6 per side
- 6+N+6 (7 times pressing)
- High performance material required
  - High Tg, high Td, high TMA
  - Low CTE
  - Halogen free
- Material must be suitable for 7 times pressing and 5 times reflow




Design rules in µm
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315
85
245
100
400
150
80
350
150
230
65
65
165
85
85
30µ
30µ
30µ
18µ
18µ
18µ
18µ
30µ
30µ
30µ
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Non preferred

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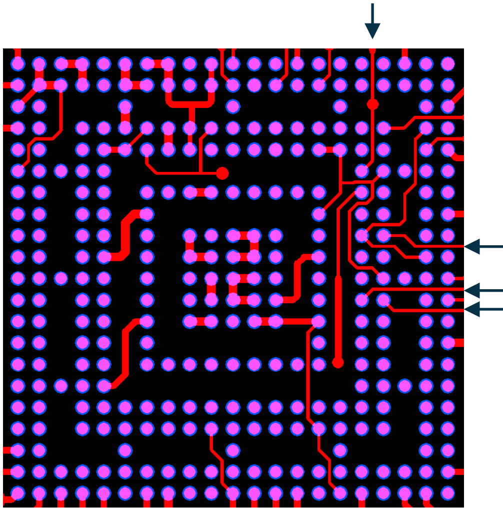
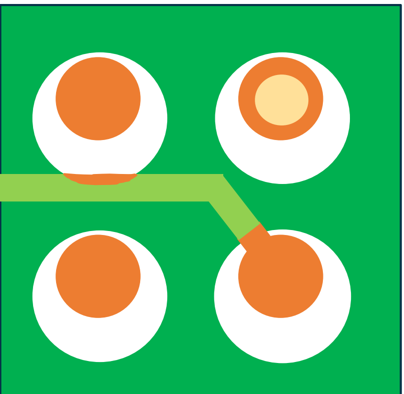
- Do not route traces between BGA balls
  - difficult to compensate the 50µ trace so trace will end up at ~35µ(low yield)
  - Solder mask mis-alignment can cause exposed trace(low yield)





Non prefered

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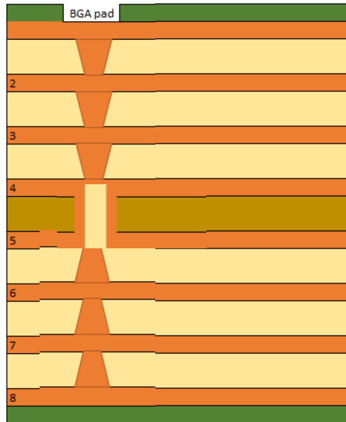
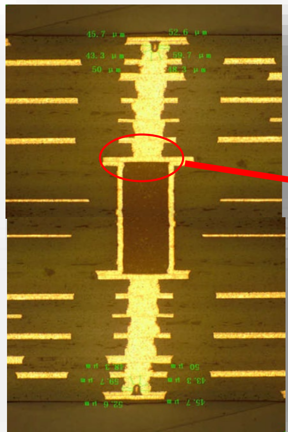
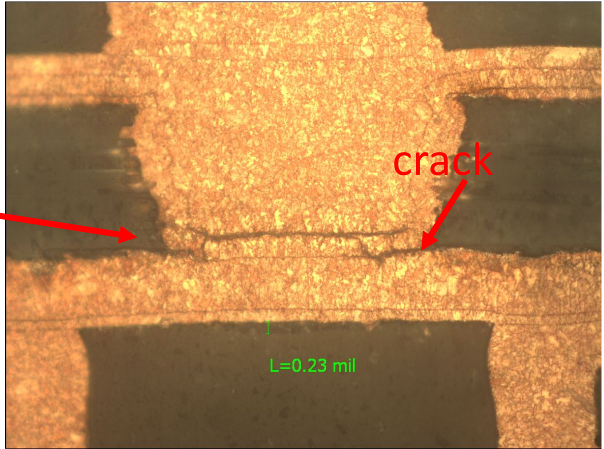
- Not recommended to do blind on top of buried via
- Possible relaibility issues when exposed to high temperatures
  - Z-axis expansion is the main problem so material with ultra high Tg is key
  - > 3 times reflow can be a problem







Contact

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- If you are not sure what which design rule to choose for your design please contact one of our technical members of the Fineline team for support.

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