Design Solutions for Fine Pitch BGA

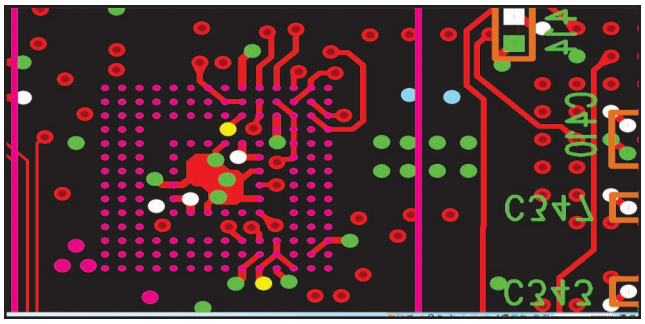
*A*CDi's engineering services team is constantly working with our customers to produce reliable PCB designs with the lowest fabrication costs for our customers. A recent design highlights ACDi's expertise in the routing of fine-pitch BGAs, and the extra effort to reduce a customer's board costs by up to 20%.

Problem:
Our customer came back to ACDi for a re-design of a board we had previously laid out. The changes to the board involved adding a .5mm pitch Toshiba flash card. The existing stack-up was a 16 layer board with all thru-vias. DFM constraints do not allow for thru-vias small enough to fit inside the pad array of this fine-pitch part. Alternative fan-out methods would need to be used.

Solutions:
1. Mirco vias- 10mil pads with 5 mil laser drills, centered in the BGA pads, layer 1-2
2. 3 mil traces with 3 mil spacing- outer two rows of pins fanned out on component side between pins
3. Plow-through routing- ACDi's proposed solution

Option 1 would have changed the stack-up of the design, resulting in higher fabrication costs (due to micro-via), and adjusting routing of existing circuits that had already been proven to work
Option 2 would have increased the cost to fabricate the board due to the tighter than industry-standard spacing requirements, and potentially would have caused issues at assembly

Resolution:
Option 3 ACDi realized there were 7 pins that could not be fanned out with through-vias that were necessitating these proposed solutions. We reached out to Toshiba to determine the pin-use of the adjacent pins. After confirmation from Toshiba that some of these pins were no connects inside of the IC, we were able to "plow-through" route these adjacent pads, and fan out directly to thru-via. The existing stack-up was maintained, the fabrication limits did not increase, and ACDi was able to reduce board costs by up to 20% while still outputting a quality design.



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Quality Policy
To meet our customer's requirements and exceed their expectations with personalized service and the highest level of customer responsiveness, while continually improving our processes, capabilities, and performance.

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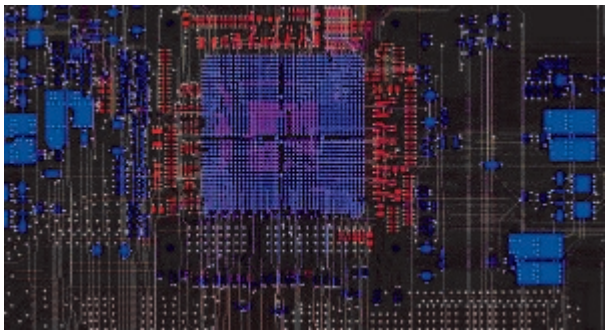
ACDi Engineering Services

PCB Layout and Design Strengths

- High frequency, RF designs
- High speed digital designs
- Multiple layers – up to 26+
- Low EMI designs for sensitive applications
- Stacked, blind, and buried vias
- Power supply
- DDR2 and DDR3 memory
- Analog designs
- PCIe, USB 2.0 & 3.0, LVDS



Software Tools

Our designers utilize industry standard professional PCB design software, including:

Mentor Graphics

- Expedition 7.9.4
- PADS Power PCB 9.5
- PADS PowerLogic Schematic Capture
- PADS BlazeRouter
- DX Designer

Cadence

- Allegro Expert 16.6
- Concept HDL Schematic Capture
- OrCAD Schematic Capture
- SPECCTRA Autorouter

Altium

- Altium Designer 14.3
- Altium Schematic Capture

Eagle

- 6.5.0 Professional

Stack-up Builder

- Polar Si 8000
- Polar Speedstack 2014

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