

CLAIMS

What is claimed is:

1. A method of determining scribing offsets, comprising:
 - 5 forming a mask above a semiconductor wafer, wherein the semiconductor wafer comprises a plurality of dies separated from each other by streets;
 - patterning the mask and the semiconductor wafer with a laser scribing process, wherein the patterning provides openings in the streets;
 - removing the mask; and
 - 10 measuring scribing offsets of the openings relative to the streets.
2. The method of claim 1, wherein the scribing offsets comprise a translational offset.
3. The method of claim 1, wherein the scribing offsets comprise an angular offset.
- 15 4. The method of claim 1, wherein measuring the scribing offsets comprises measuring an offset of all of the openings on the semiconductor wafer.
5. The method of claim 1, wherein measuring the scribing offsets comprises:
 - 20 determining a plurality of offsets along a length of a single opening; and
 - calculating an average offset of the plurality of offsets.
6. The method of claim 1, further comprising:
 - calculating an offset correction; and
 - 25 storing the offset correction.
7. The method of claim 6, wherein the offset correction is used to update a wafer map used in scribing processes of subsequent semiconductor wafers.
- 30 8. The method of claim 1, wherein the semiconductor wafer is a production wafer.
9. The method of claim 1, wherein the semiconductor wafer is a short-loop wafer.
10. The method of claim 9, wherein the short-loop wafer comprises bumping and die dimensions
35 that are the same as a production wafer.

11. A method of singulating a semiconductor wafer, comprising:
forming a mask above a semiconductor wafer, wherein the semiconductor wafer
comprises a plurality of dies separated from each other by streets; and
patterning the mask and semiconductor wafer with a laser scribing process that utilizes a
5 wafer map that has integrated an offset correction, wherein the patterning provides openings
through the mask and into the streets of the semiconductor wafer.
12. The method of claim 11, wherein the laser scribing process singulates the dies of the
semiconductor wafer.
- 10 13. The method of claim 11, further comprising:
plasma etching the semiconductor wafer through the openings, wherein the plasma
etching singulates the dies of the semiconductor wafer.
- 15 14. The method of claim 11, wherein the offset correction comprises a translational offset.
15. The method of claim 11, wherein the offset correction comprises an angular offset.
16. A semiconductor wafer, comprising:
20 a semiconductor substrate;
a device layer over the semiconductor substrate;
a plurality of dies in the device layer, wherein the dies are separated from each other by
streets; and
trenches in the streets, wherein one or more of the trenches are misaligned with the
25 streets.
17. The semiconductor wafer of claim 16, wherein the misalignment comprises one or both of a
translation offset from the streets or an angular offset from the streets.
- 30 18. The semiconductor wafer of claim 16, wherein the semiconductor wafer is a short-loop
wafer.
19. The semiconductor wafer of claim 16, wherein the semiconductor wafer is a production
wafer.

20. The semiconductor wafer of claim 16, wherein the trenches extend through the device layer.