CLAIMS

1. A method for fabricating devices on a wafer comprising:

generating a wafer map which is an optimum wafer map with an optimum number of devices comprising:

determining a Y shift value on the wafer map, wherein the Y shift value is based on an initial horizontal die placement line on which an initial die is placed, wherein the initial horizontal die placement line is placed on a flat area horizontal line having ~~has~~ an initial y value y_1~~,~~ which is the same for all types of wafers, wherein y values of other horizontal die placement lines are determined by increasing the initial y value by multiples of a die height (die_height) of dies,

determining X shift values on the wafer map, wherein the X shift values are based on x values of intersection points of horizontal die placement lines located at y locations and an edge exclusion of the wafer (HL/EE intersection points),

calculating the optimum wafer map based on the Y shift value and the X shift values; and

fabricating devices on the wafer according to the optimum wafer map.

2. The method of claim 1, wherein when the initial die is placed on ~~a~~ the flat area horizontal line, the initial y value y_1 is equal to $-(R_w - h_{FA})$,

wherein

R_w = a radius of the wafer map,

h_{FA} = a height of a wafer map flat area which is determined from an edge bottom of the wafer to a center point of the wafer, and

wherein the flat area horizontal line delineates the wafer map flat area from a wafer map die region.

3. The method of claim 2, wherein the height h_{FA} is the same for all types of wafers, including wafers for different types of dies or different die sizes.

4. ~~The method of claim 1,~~ A method for fabricating devices on a wafer comprising:

generating a wafer map which is an optimum wafer map with an optimum number of devices comprising:

determining a Y shift value on the wafer map, wherein the Y shift value is based on an initial horizontal die placement line on which an initial die is placed, wherein the initial horizontal die placement line has an initial y value y_1, wherein y values of other horizontal die placement lines are determined by increasing the initial y value by multiples of a die height (die_height) of dies, wherein the Y shift value is further based on horizontal die center lines of dies placed on the horizontal die placement lines, wherein the initial value of horizontal die center line y_{c1} is equal to y_1 + (1/2 x (die_height));

determining X shift values on the wafer map, wherein the X shift values are based on x values of intersection points of horizontal die placement lines located at y locations and an edge exclusion of the wafer (HL/EE intersection points),

calculating the optimum wafer map based on the Y shift value and the X shift values; and

fabricating devices on the wafer according to the optimum wafer map.

5. The method of claim 4, wherein the Y shift value corresponds to a y value of the horizontal die center line closest to a center of the wafer (y_{ccw}).

6. The method of claim 4, wherein determining the Y shift value comprises:

calculating a remainder value R, wherein R = y_{c1} % die_height;

if |R| ≤ (die_height/2), then the Y shift value = |R|;

if |R| > (die_height/2) and R ≤ 0, then the Y shift value = R + die_height; and

if |R| > (die_height/2) and R > 0, then the Y shift value = R - die_height.

7. The method of claim 1, wherein the X shift values are associated with x values of centers of the dies at the HL/EE intersection points.

8. The method of claim 1, wherein:

the HL/EE intersection points of the dies in a top right quadrant of the wafer map comprise top right vertices of the dies;

the HL/EE intersection points of the dies in a top left quadrant of the wafer map comprise top left vertices of the dies;

the HL/EE intersection points of the dies in a bottom right quadrant of the wafer map comprise bottom right vertices of the dies; and

the HL/EE intersection points of the dies in a bottom left quadrant of the wafer map comprise bottom left vertices of the dies.

9. The method of claim 1, wherein determining the X shift values comprises:

calculating the x values of the HL/EE intersection points associated with the horizontal die placement line located at a y location, wherein $x = \sqrt{r^2 - y^2}$;

verifying a quadrant location of each of a pair of the x and y values of the HL/EE intersection points; and

calculating the X shift values for each of the pair of the x and y values of the HL/EE intersection points using x values of centers of the dies at the HL/EE intersection points.

10. The method of claim 9, wherein determining the X shift values further comprises:

calculating other y locations by increasing previous y location by the die height; and

determining the X shift values based on the x values of the HL/EE intersection points associated with the horizontal die placement line located at each of the other y locations when the other y locations is smaller than a radius of the wafer map R_w.

11. The method of claim 1, wherein calculating the optimum wafer map comprises:

calculating die counts for each of the X shift values associated with the Y shift value; and

using the Y shift value and a X shift value which provides a highest die count for the optimum wafer map.

12. The method of claim 1, wherein the generating of the wafer map can be performed through executing instructions embodied in a non-transitory computer-readable media, wherein the instructions is executed by a machine configured to be operative with the non-transitory computer-readable media.

13. A wafer comprising:

a plurality of dies disposed within a die region within an edge exclusion of a wafer according to a die layout containing an optimum number of dies; and

wherein the die layout is determined from

a Y shift value which is based on an initial horizontal die placement line on which an initial die is placed, wherein the initial horizontal die placement line is placed on a flat area horizontal line having ~~has~~ an initial y value y_1~~,~~ which is the same for all types of wafers, wherein y values of other horizontal die placement lines are determined by increasing the initial y value by multiples of a die height (die_height) of the dies,

X shift values on the wafer map, wherein the X shift values are based on x values of intersection points of horizontal die placement lines located at y locations and an edge exclusion of the wafer (HL/EE intersection points), and

the Y shift value and a X shift value which produce the most number of dies on the wafer map.

14. The wafer of claim 13, wherein when the initial die is placed on ~~a~~ the flat area horizontal line, the initial y value y_1 is equal to $-(R_w - h_{FA})$,

wherein

R_w = a radius of the wafer map,

h_{FA} = height of a wafer map flat area which is determined from an edge bottom of the wafer to a center point of the wafer, and

wherein the flat area horizontal line delineates the wafer map flat area from the die region.

15. The wafer of claim 14, wherein the height h_{FA} is the same for all types of wafers,

including wafers for different types of dies or different die sizes.

16. ~~The wafer of claim 13,~~ A wafer comprising:

a plurality of dies disposed within a die region within an edge exclusion of a wafer according to a die layout containing an optimum number of dies; and

wherein the die layout is determined from

a Y shift value which is based on an initial horizontal die placement line on which an initial die is placed, wherein the initial horizontal die placement line has an initial y value y_1, wherein y values of other horizontal die placement lines are determined by increasing the initial y value by multiples of a die height (die_height) of the dies, wherein the Y shift value is further based on horizontal die center lines of dies placed on the horizontal die placement lines, wherein an initial value of a horizontal die center line y_{c1} is equal to y_1 + (1/2 x (die_height)),

X shift values on the wafer map, wherein the X shift values are based on x values of intersection points of horizontal die placement lines locaed at y locations and an edge exclusion of the wafer (HL/EE intersection points), and

the Y shift value and a X shift value which produce the most number of dies on the wafer map.

17. The wafer of claim 16, wherein determining the Y shift value comprises:

calculating a remainder value R, wherein R = y_{c1} % die_height;

if $|R| \leq$ (die_height/2), then the Y shift value = |R|;

if $|R| >$ (die_height/2) and $R \leq 0$, then the Y shift value = R + die_height; and

if $|R| >$ (die_height/2) and $R > 0$, then the Y shift value = R - die_height.

18. The wafer of claim 13, wherein determining the X shift values comprises:

calculating the x values of the HL/EE intersection points associated with the horizontal die placement line located at a y location, wherein $x = \sqrt{r^2 - y^2}$;

verifying a quadrant location of each of a pair of the x and y values of the HL/EE intersection points; and

calculating the X shift values for each of the pair of the x and y values of the HL/EE intersection points using x values of centers of the dies at the HL/EE intersection points.

19. The wafer of claim 18, wherein determining the X shift values further comprises:

calculating other y locations by increasing previous y location by the die height; and

determining X shift values based on x values of the HL/EE intersection points associated with the horizontal die placement line located at each of the other y locations when the other y locations is smaller than a radius of the wafer R_w.

20. A method for generating a wafer map of a wafer with an optimum number of dies comprising:

determining a Y shift value on the wafer map, wherein the Y shift value is based on an initial horizontal die placement line on which an initial die is placed, wherein the initial horizontal die placement line is placed on a flat area horizontal line having ~~has~~ an initial y value y_1~~,~~ which is the same for all types of wafers, wherein y values of other horizontal die placement lines are determined by increasing the initial y value by multiples of a die height (die_height) of dies;

determining X shift values on the wafer map, wherein the X shift values are based on x values of intersection points of horizontal die placement lines located at y locations and an

edge exclusion of the wafer (HL/EE intersection points); and

calculating an optimum wafer map based on the Y shift value and the X shift values.