

WAFER FRAME CARRIER

Technical Field

[0001] At least one embodiment of the present disclosure provides a wafer frame carrier, and more particularly, a wafer frame carrier with metal bumper behind a cassette structure.

Description of the Related Art

[0002] In the semiconductor carrier industry, the storage or transferring of various semiconductor components or semiconductor semi-finished products has become a very important issue. In the case where automatic machines are already in common use, how to transfer required materials or semiconductor components to the desired location will test the properties of the carrier, such as reducing the generation of tiny particles, antistatic, or air tightness.

[0003] Common semiconductor components that need to be stored or shipped include wafers, substrates, reticle or wafer frames thereof. The sizes used in different semiconductor processes are different. Therefore, carriers are developed in various sizes in light of the different semiconductor processes.

[0004] The wafer frame can also be called a tape frame, and the main function of the wafer frame is used as a semiconductor component for fixing a wafer during wafer dicing. Most of the wafer frames are carried by special carriers.

[0005] However, most of the conventional wafer frame carriers are integrally formed to be a polymer case. When the wafer frame is inserted, the wafer frame is often hit by a stopper. Due to that metals typically have higher hardness than a polymer, when the polymer is often hit by the metals, even a polymer material having high hardness and wear resistance is prone to breakage or generation of minute particles.

[0006] Moreover, the wafer frame is a heavier metal. Therefore, when the wafer

frame carrier is carried by an overhead crane, it is easy to cause stress deformation of the wafer frame carrier due to the weight per se. Once the container of the carrier is deformed, it may cause the required air tightness disappear.

[0007] However, a support member for supporting the plate-shaped sheet in the container is usually mounted on a door of a container. The support member may protrude from the door. When the door is moved by a robot arm to up and down, an opening of the wafer frame carrier may easily be scratched. Therefore, the conventional wafer frame carrier has many inconveniences in use and is in urgent need of improvement.

SUMMARY

[0008] To solve the problems mentioned in the prior art, the claimed invention provides a wafer frame carrier. The wafer frame carrier mainly includes a container, two cassette structures, two metal bumpers, and a door.

[0009] The container includes a container space formed by an opening, a top plate, a bottom plate, a posterior plate, and two sideboards. The two cassette structures are disposed on the two sideboards of the container space. The two metal bumpers are sequentially mounted on a back side near the posterior plate. The door covers the opening of the container. The two metal bumpers are sequentially fixed to the two side plates through a plurality of screwing elements.

[0010] The above summary of the present invention is intended to provide a basic description of the various aspects and features of the present invention. The present invention is not to be construed as being limited to the details of the present invention, and the invention is not intended to limit the scope of the

present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

- [0011] Fig. 1 is a schematic view of an embodiment of the present disclosure.
- [0012] Fig. 2 is a schematic view of the embodiment of the present disclosure after opening a top plate.
- [0013] FIG. 3 is a schematic view of a supporting structure of an embodiment of the present disclosure.
- [0014] Fig. 4 is a schematic view of a part of a supporting structure of an embodiment of the present disclosure.
- [0015] FIG. 5 is a schematic view of a supporting structure and a door of an embodiment of the present disclosure.
- [0016] Fig. 6 is a cross-sectional view of a container of an embodiment of the present disclosure.
- [0017] FIG. 7 is a schematic view showing a structure of a screwing element of an embodiment of the present disclosure.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

- [0018] In order to understand the technical features and practical effects of the present disclosure, and in accordance with the contents of the specification, the following further describes preferred embodiments as shown in the following figure:

[0019] First of all, please refer to FIG. 1 and FIG. 2. FIG. 1 is a schematic structural view of an embodiment of the present disclosure. FIG. 2 is a schematic view of the embodiment of the present disclosure after opening a top plate. As shown in FIG. 1 and FIG. 2, a wafer frame carrier 10 mainly includes a container 100 and a two cassette structures 106 (another cassette structure 106 is not shown in FIG. 2 which is disposed inside a sideboard 105 opposite to said cassette structure 106 in FIG. 2), two metal bumper 107 (another metal bumper 107 is not shown in FIG. 2 which is provided inside the sideboard 105 opposite to said cassette structure 106 in FIG. 2), and the door 200.

[0020] The container 100 includes a container space formed by an opening 101, a top plate 102, a bottom plate 103, a posterior plate 104, and two sideboards 105. The cassette structure 106 is mounted on the two sideboards 105 and in the container space. Furthermore, the cassette structure 106 is mounted on the sideboard 105 of the container space. The metal bumper 107 is sequentially mounted on one side of the cassette structure 106 near the posterior plate 104. The door 200 covers the opening 101. The metal bumpers 107 mounted on the left and right sides are sequentially and respectively screwed on the sideboards 105 through a plurality of screwing elements 108.

[0021] In the embodiment shown in FIG. 1 and FIG. 2, the metal bumper 107 mounted on the left and right sides can replace the sideboard 105 of the container 100 to withstand an impact of the wafer frame when the wafer frame is inserted in the cassette structure 106. The metal bumper 107 can be designed as a high-hardness metal such as stainless steel, high-speed steel, or aluminum alloy. It is possible to further prevent the wafer frame made of metal from crashing the container 100, causing damage, leakage, or risk of generating minute particles. For the convenience of the technician to ship the wafer frame, the top plate 102

of the wafer frame carrier 10 of the embodiment is further provided with at least one handle 500.

[0022] In addition, as shown in FIG. 2, in the embodiment, an anti-deformation member 300 is further mounted on a side of the top plate 102 adjacent to the opening. In this embodiment, the anti-deformation member 300 is a metal strip, and the metal strip is provided with a plurality of fixing holes (not shown, which have been passed through the plurality of fixing members 301). A plurality of fixing members 301 passes through the fixing holes of the metal strip to stabilize the metal strip on the side of the top plate 102 near the opening 101. The wafer frame carrier 10 is made of a relatively heavy metal. Therefore, when the wafer frame carrier 10 is fully loaded, a crane lifts the wafer frame carrier 10, which easily causes the opening 101 to be deformed.

[0023] Once the opening 101 is deformed, the air tightness of the wafer frame carrier 10 and the door 200 is broken, hence the airtight effect cannot be sustained. However, this phenomenon can be effectively minimized by the configuration of the anti-deformation member 300. In addition, when a plurality of fixing elements 301 passes through the fixing holes to fix the metal strip on the side of the top plate 102 near the opening 101, the plurality of fixing elements 301 does not penetrate the top plate 102. Instead, the fixing elements 301 are embedded in the top plate 102. It is further ensured that the airtightness of the container 100 is not affected.

[0024] The different sizes of containers required for different sizes of wafer frames, and the weights of the wafer frames are not the same. Therefore, in other possible embodiments, the anti-deformation member 300 mounted on the container 100 may be designed in the form of a metal cage. The metal cage can be mounted and around the opening 101, the top plate 102, the bottom plate 103,

the posterior plate 104, or the sideboards 105, thus to make the container 100 less susceptible to deformation. The present disclosure is not limited thereto. On the other hand, the container 100 can further includes a plurality of anti-deformation ribs in an integrally form of the container 100 to further stabilize the structure per se.

[0025] The door 200 in the embodiment is provided with a pair of latches 202 for fixing the door 200 on the opening 101, therefore the container 100 of the wafer frame carrier 10 fulfills the requirement of the airtightness.

[0026] With reference to FIG. 3, FIG. 4, and FIG. 5. FIG. 3 is a schematic view of a supporting structure of the embodiment of the present disclosure. FIG. 4 is a schematic view of a part of the supporting structure of the embodiment of the present disclosure. FIG. 5 is a schematic view of a supporting structure and a door of the embodiment of the present disclosure.

[0027] As shown in FIG. 3, the inner side of the door 200 of the embodiment further includes a supporting portion 201, and the supporting portion 201 includes a main board 2011. In order to realize the structure of the supporting portion 201, please refer to the portion of the circular dotted line in FIG. 3, and the detailed structure of the portion is shown in FIG. 4. As shown in FIG. 4, the supporting portion 201 in this embodiment comprises a main board 2011, a plurality of through holes 2012, a plurality of supporting elements 2013, and a plurality of engaging elements 2014.

[0028] The plurality of through holes 2012 are mounted on and passed through the main board 2011, and the through hole 2012 is shaped like a gourd. Therefore, the engaging elements 2014 can be passed through larger openings of the gourd-shaped through holes 2012, and then the engaging elements 2014 slide in the direction indicated by the arrow marked in FIG. 4, engaging the main board

2011 in small openings of the gourd-shaped through holes 2012. The main board 2011 is further fixed to the inner surface of the door 200, and the entire supporting portion 201 is fixed to the door 200.

[0029] The advantages of the above structure not only can be easily installed, but also allow the technician to replace the supporting portion 201 in different shapes. In addition, the engaging elements 2014 is not mounted on the door 200, but is embedded in the door 200. Thereby, the airtightness of the container 100 of the wafer frame carrier 10 can be further ensured. In a more preferred embodiment, the engaging elements 2014 can also be an integral part of the inner surface of the door 200, reducing the cost of installation.

[0030] The plurality of supporting elements 2013 are disposed on the main board 2011, it is mainly responsible for supporting the wafer frame when the door 200 covers the opening 101 to prevent the door 200 from being intimate or even damaged due to shaking or vibration. In the embodiment, the supporting elements 2013 is designed as a slap-like structure, and the slap-like structure has a concave structure, which can further withstand and slow down the swing amplitude of the wafer frame as it sways up and down along the container 100.

[0031] The door 200 usually needs to be opened by a robot arm before the wafer frame is taken out or inserted in the wafer frame carrier 10. When the door 200 is opened, the door panel 200 is removed in the up and down direction. Therefore, the opening 101 is exposed and the wafer frame can be picked up or placed in the wafer frame carrier 10. Therefore, in order to avoid the scraping or damaging of opening 101 by the plurality of supporting elements 2013 which moves with the door 200. As shown in FIG. 5, the plurality of supporting elements 2013 in this embodiment is designed to protrude from the door 200 by less than 0.5 cm. Therefore, when the robot arm moves the door 200 to open or close, the structure

of the plurality of supporting elements 2013 or the opening 101 of the container 100 can be prevented from being damaged and resulting in a large amount of minute particles.

[0032] FIG. 6 and FIG. 7. FIG. 6 is a cross-sectional view of a container of an embodiment of the present disclosure. FIG. 7 is a schematic view showing a structure of a screwing element of an embodiment of the present disclosure. As shown in FIG. 6, FIG. 6 is a cross-sectional view taken along a plane in which the pair of metal bumpers 107 is co-structured in the embodiment of FIG. 1 and FIG. 2. In light of the illustration of Fig. 6, it can be clearly seen that a transparent window 400 is mounted on the posterior plate 104 in the embodiment.

[0033] In this embodiment, the transparent window 400 may be selected from glass or plastic doped with metal ions. The color of the transparent window 400 can be transparent or orange as needs. and the invention is not limited. Fig. 7 shows an enlarged schematic view of the partial structure shown by a circular dotted line in FIG. 6.

[0034] As shown in FIG. 7, in the present embodiment, the plurality of screwing elements 108 fix the metal bumper 107 through a plurality of embedded elements 109 embedded in the sideboard 105. Further, an outer surface of the metal bumper 107 corresponding to the sideboard 105 is further provided with a plurality of airtight ribs 1051. According to a structural mentioned above, the purpose of mounting the metal bumper 107 can be achieved while maintaining airtightness and structural stability. The provision of the airtight ribs 1051 can further prevent the risk that the metal bumper 107 is detached due to deformation of the sideboard 105.

[0035] There are many inventions described and illustrated above. The present inventions are neither limited to any single aspect nor embodiment thereof, nor to any combinations and/or permutations of such aspects and/or embodiments. Moreover, each of the aspects of the present inventions, and/or embodiments thereof, may be employed alone or in combination with one or more of the other aspects of the present inventions and/or embodiments thereof. For the sake of brevity, many of those permutations and combinations will not be discussed separately herein.

CLAIMS

1. A wafer frame carrier, comprising:

a container, comprising a container space formed by an opening, a top plate, a bottom plate, a posterior plate, and two sideboards;

two cassette structures, mounted on the two sideboards of the container space;

two metal bumpers, sequentially mounted on a back side of the cassette structure near the posterior plate; and

a door, covering the opening of the container;

wherein the two metal bumpers are sequentially fixed to the two side plates through a plurality of screwing elements;

wherein the door further comprises a supporting portion, and the supporting portion further comprising:

a main board;

a plurality of through holes, mounted on the main board; wherein the plurality of through holes are gourd-shaped;

a plurality of supporting elements, mounted on the main board; and

a plurality of engaging elements, passed through the through holes; wherein the supporting portion is fixed to the door by the engaging elements.

2. The wafer frame carrier as claimed in claim 1, wherein an anti-deformation member is mounted on a side of the top plate adjacent to the opening.

3. The wafer frame carrier as claimed in claim 2, wherein the anti-deformation is a metal strip, and the metal strip comprises a plurality of fixing holes;

wherein a plurality of fixing members pass through the fixing holes of the metal strip to fix the metal strip on the side of the top plate near the opening.

4. The wafer frame carrier as claimed in claim 1, wherein a transparent window is mounted on the posterior plate.
5. The wafer frame carrier as claimed in claim 1, wherein at least one handle is mounted on the top plate.
6. The wafer frame carrier as claimed in claim 1, wherein at least one latch is mounted on the door.
7. The wafer frame carrier as claimed in claim 1, wherein the plurality of screwing elements fix the metal bumper through a plurality of embedded elements embedded in the sideboard.
8. The wafer frame carrier as claimed in claim 7, wherein a plurality of airtight ribs are mounted on an outer surface of the metal bumper corresponding to the sideboard.