

DESCRIPTION

DEVICE HANDLER AND DIGITAL CODE RECOGNITION SYSTEM USED THEREFOR

TECHNICAL FIELD

[0001] The present invention disclosed herein relates to a device handler, and more particularly, to a device handler for performing at least one of inspection and classification on devices and a digital code recognition system used therefor.

BACKGROUND ART

[0002] Semiconductor devices (hereinafter, referred to as a 'devices') go through various inspections, such as electrical characteristics tests and reliability tests for heat or pressure, by a semiconductor device inspection apparatus after the packaging process is completed.

[0003] Inspection of the devices includes various tests, such as a room temperature test performed in a room temperature environment, a heating test performed in a high temperature environment, or the like, which are performed depending on the type of devices such as memory devices or non-memory devices such as central processing units (CPUs) and graphic processing units (GPUs), LED devices, or solar devices.

[0004] Memory devices, such as synchronous dynamic random access memory (SDRAM) and NAND flash memory, which are generally standardized and mass-produced, go through a systematic inspection process such as burn-in testing, and the inspection process is generally performed separately from a sorting process. Patent Documents 8

and 9 disclose a device sorting apparatus (burn-in sorter) for performing a sorting process for devices that have been burn-in tested.

[0005] On the other hand, for non-memory devices that are produced in a relatively large number of types and in small quantities, the inspection process and the sorting process are generally performed at the same time.

[0006] Meanwhile, as the types of IT devices such as smartphones, smart pads, and smart TVs become more diverse and popular, the demand for non-memory devices such as CPUs, that is, large scale integrations (LSIs) is rapidly increasing.

[0007] The LSI is being tested to see whether it operates smoothly in harsh environments, that is, in high-temperature and low-temperature environments.

[0008] In order to perform such device inspection, Patent Documents 1 to 7 disclose various device inspection apparatuses according to the type of devices and the content of the inspection.

[0009] Meanwhile, device handlers presented in Patent Documents 1 to 9 generally perform loading or unloading of devices by using a tray on which a plurality of devices are loaded.

[0010] FIG. 1 is a perspective view showing an example of a tray for transferring devices, and FIG. 2 is a plan view of the tray of FIG. 1.

[0011] As shown in FIGS. 1 and 2, a tray 20 for transferring devices has a rectangular planar shape and a plurality of device seating parts 21 on which a plurality of devices 10 are seated is formed thereon.

[0012] Here, the tray 20 is standardized according to the device manufacturer, and a digital code 31 for specifying the tray 20 is formed on at least one of the upper surface and the side surface.

[0013] The digital code 31 is a digital code recognized through image recognition using a scanner, camera, or the like, such as a barcode or QR code, and may be formed directly on the tray 20 or formed on a digital cover 30 attached to the tray 20.

[0014] Meanwhile, when the digital code 31 is formed on the side surface of the tray 20, there is the following problems.

[0015] First, there is a problem in that recognition of the digital code 31 is limited since the installation positions of the scanner and camera for recognizing the digital code 31 are not free in the device handler having a compact structure.

[0016] In addition, there is a problem in that the digital code recognition is not smooth since the lighting for recognizing the digital code 31 is insufficient due to the shadow of other members installed adjacent to the tray, which is the target of the digital code recognition.

[0017] (Patent Document 1) KR10-1169406 B

[0018] (Patent Document 2) KR10-2012-0004068 A

[0019] (Patent Document 3) KR10-1177746 B

[0020] (Patent Document 4) KR10-1216359 B

[0021] (Patent Document 5) KR10-2013-0099781 A

[0022] (Patent Document 6) KR10-1417773 B

[0023] (Patent Document 7) KR10-2017-0095655 A

[0024] (Patent Document 8) KR10-1177319 B

[0025] (Patent Document 9) KR10-2016-0133125 A.

DISCLOSURE OF THE INVENTION

TECHNICAL PROBLEM

[0026] In order to solve the above-mentioned problems, an object of the present invention is to provide a device handler capable of reliably recognizing a digital code formed on the side surface of a tray, and of making a digital code recognition system for digital code recognition compact and a digital code recognition system used therefor.

TECHNICAL SOLUTION

[0027] In order to achieve the above-mentioned object, in accordance with an embodiment of the present invention, a digital code recognition system recognizes a digital code (31) formed on a side surface of a tray (20) on which a plurality of devices (10) are loaded by being installed in a device handler that receives the devices (10) by using the tray (20) and performs at least one of inspection and classification on the devices (10), and recognizes the digital code (31) of the tray (20) located in at least one digital code recognition area (RS) set on a movement route of the tray (20) in the device handler, and the digital code recognition system includes a light path change unit (100) installed at a location facing the digital code (31) formed on the side surface of the tray (30) to change a light transmission path (L) of an image of the digital code (31), and an image acquisition unit (200) recognizing the image of the digital code (31) transmitted by the light path change unit (100).

[0028] The image acquisition unit (200) may be located above the tray (20) located in the digital code recognition area (RS), and the light path change unit (100) may include a first reflecting member (110) for changing the light transmission path (L) upward from the side surface of the tray (30), and a second reflecting member (120) for changing the light transmission path (L) changed by the first reflecting member (110) to the image acquisition unit (200).

[0029] The digital code recognition system (130) may further include an illuminating unit 130 for illuminating the digital code (31).

[0030] The illuminating unit (130) may be installed to face the digital code (31) formed on the side surface of the tray (30).

[0031] The light path change unit (100) and the illuminating unit (130) may constitute one module.

[0032] The digital code (31) may be at least one of a barcode and a QR code.

[0033] In accordance with an embodiment of the present invention, a device handler receiving a plurality of devices (10) by using a tray (20) on which the devices (10) are loaded and performing at least one of inspection and classification on the devices (10) includes the digital code recognition system having configurations described above, the digital code recognition system recognizing a digital code (31) of the tray (20) located in at least one digital code recognition area (RS) set on a movement route of the tray (20).

[0034] The device handler may further include a loading unit loading the tray (20) on which the devices (10) on which at least one of inspection and classification is to be performed are loaded and an unloading unit unloading the tray (20) on which the devices (10) on which at least one of inspection and classification has been performed are loaded, and the digital code recognition area (RS) may be set in at least one of the loading unit and the unloading unit.

[0035] The unloading unit may use the tray (20) emptied in the loading unit.

ADVANTAGEOUS EFFECTS

[0036] The device handler and the digital code recognition system used therefor according to the present invention have advantages of stably recognizing a digital code and

making compact the digital code recognition system for digital code recognition by locating the image acquisition unit for digital code recognition above the tray and additionally providing a light path transmission unit for changing the light path so that the image of the digital code formed on the side surface of the tray reaches the image acquisition unit.

[0037] Furthermore, by additionally providing the illuminating unit for performing illumination so that the image acquisition for the digital code is smooth in configuring the light path transmission unit, there is advantages of stably recognizing a digital code, and making compact the digital code recognition system for digital code recognition.

BRIEF DESCRIPTION OF THE DRAWINGS

[0038] FIG. 1 is a perspective view showing an example of a tray.

[0039] FIG. 2 is a plan view of the tray of FIG. 1.

[0040] FIG. 3 is a front view showing the concept of a digital code recognition system according to the present invention.

[0041] FIG. 4 is a left side view of the digital code recognition system and tray shown in FIG. 3.

MODE FOR CARRYING OUT THE INVENTION

[0042] Hereinafter, a device handler and a digital code recognition system used therefor according to the present invention will be described with reference to the accompanying drawings.

[0043] As shown in FIGS. 3 and 4, the digital code recognition system according to the present invention is a digital code recognition system that recognizes a digital code 31 formed on the side surface of the tray 20 by being installed in the device handler that

receives devices 10 by using a tray 20 on which the plurality of devices 10 are loaded and performs at least one of inspection and classification on the devices 10.

[0044] The digital code recognition system according to the present invention is a system for recognizing the digital code 31 formed on the side surface of the tray 20, and is applied to any device handler that receives the devices 10 by using the tray 20 on which the plurality of devices 10 are loaded and performs at least one of inspection and classification on the device 10.

[0045] That is, the digital code recognition system according to the present invention may be used for the device handlers presented in Patent Documents 1 to 9 as the device handler configured to use the tray 20 having the digital code 31 formed on the side surface and recognize the digital code 31 in the process of handling such as movement of the tray 20.

[0046] Meanwhile, as shown in FIGS. 1 and 2, the tray 20 on which the digital code 31, which is the object to be recognized by the digital code recognition system according to the present invention, is formed, has a rectangular planar shape, and has a configuration in which device seating portions 21 on which the semiconductor devices 10 are seated are formed in an $N \times M$ arrangement (N and M are natural numbers equal to or greater than 2) by a combination of grooves and protrusions, but may have various configurations.

[0047] The tray 20 is preferably formed in a standardized manner, such as a JEDEC tray, and may have various shapes depending on the type and size of the devices 10 to be seated.

[0048] Furthermore, a plurality of the trays 20 are transferred while being stacked up and down in a moving process, that is, in terms of logistics, and thus it is preferable that the tray 20 has a structure for preventing horizontal sliding in the state of being stacked up

and down.

[0049] In addition, it is preferable that the tray 20 has a transfer structure allowing grip and pickup by a tray transport apparatus installed in the device handler, so called a tray transfer.

[0050] For example, the transfer structure may be made as at least one of grooves 23 and protrusions 24 formed on the front and rear, left and right side surfaces of the tray 20.

[0051] Meanwhile, the digital code 31 formed on the side surface of the tray 20 is a digital mark recognized through a scanner or camera, such as a barcode or a QR code, at least one of which may be used.

[0052] Further, the digital code 31 is directly formed on the side surface of the tray 20, or as shown in FIGS. 1 and 2, may be formed on the surface of a sheet 30 attached to the proper position among the side surfaces of the tray 20.

[0053] Here, the sheet 30 on which the digital code 31 is formed is a sheet that is adhered to the side surface of the tray 20 by applying an adhesive material to a surface attached to the side surface of the tray 20, and various sheets such as paper and vinyl tape may be used.

[0054] Meanwhile, the digital code recognition system according to the present invention has a configuration of recognizing the digital code 31 of the tray 20 located in at least one digital code recognition area RS set on a movement route of the tray 20 in the device handler, but may have various configurations.

[0055] Here, the digital code recognition area RS is an area set on the movement route of the tray 20 in the device handler, and by first recognizing the tray 20 located in the digital code recognition area RS before performing the handling process such as inspection and classification, and then matching the digital code 31 and tray 20 recognized as results

before and after the handling process, the results of the handling process may be used in a subsequent process.

[0056] Meanwhile, as shown in FIG. 2, the digital code recognition system according to the present invention may include a light path change unit 100 installed at a location facing the digital code 31 formed on the side surface of the tray 30 to change a light transmission path L of an image of the digital code 31; and an image acquisition unit 200 recognizing the image of the digital code 31 transmitted by the light path change unit 100.

[0057] The image acquisition unit 200 has a configuration of recognizing the image of the digital code 31 transmitted by the light path change unit 100, and a scanner, a camera, or the like may be used.

[0058] In addition, the image acquisition unit 200 may be installed on various sites, for example, above, to the left of, or behind the tray 20, based on the tray 20 located in the digital code recognition area RS in the device handler, depending on installation conditions.

[0059] For example, the image acquisition unit 200 is preferably located above the tray 20 in order to minimize interference with the configuration for handling of the tray 20 such as transfer of the tray 20.

[0060] In this case, the digital code recognition system according to the present invention further includes the light path change unit 100 installed at a location facing the digital code 31 formed on the side surface of the tray 30 and changes the light transmission path L of the image of the digital code 31, allowing the image of the digital code 31 to reach the image acquisition unit 200.

[0061] The light path change unit 100 is installed at a location facing the digital code 31 formed on the side surface of the tray 30 and has a configuration of changing the light transmission path L of the image of the digital code 31, and may have various

configurations.

[0062] For example, the light path change unit 100 may have any configuration as long as it may change the light path, including reflecting means such as a mirror and a prism, and a lens for divergence and convergence of light.

[0063] Further, the light path change unit 100 may further include one or more body members on which reflecting means, lenses, and the like are installed.

[0064] Meanwhile, there is a problem in that, when the digital code 31 is formed on the side surface of the tray 20 when the image acquisition unit 200 is located above the tray 20, the image acquisition unit 200 does not smoothly recognize the digital code 31 formed on the side surface of the tray 20.

[0065] In particular, the illuminance of the side surface of the tray 20 on which the digital code 31 is formed is often insufficient, and the change in shading is severe due to an auxiliary device located near the side surface of the tray 20 located in the digital code recognition area RS, and in these cases, there is a problem in that the image acquisition unit 200 does not smoothly recognize the digital code 31 formed on the side surface of the tray 20.

[0066] Accordingly, when the image acquisition unit 200 is located above the tray 20 located in the digital code recognition area RS, the light path change unit 100 may include a first reflecting member 110 for changing the light transmission path L upward from the side surface of the tray 30, and a second reflecting member 120 for changing the light transmission path L changed by the first reflecting member 110 to the image acquisition unit 200.

[0067] The first reflecting member 110 has a configuration of changing the light transmission path L upward from the side surface of the tray 30, and any member capable

of reflecting light such as a mirror may be used.

[0068] The second reflecting member 120 is a configuration of changing the light transmission path L changed by the first reflecting member 110 to the image acquisition unit 200, and any member capable of reflecting light such as a mirror may be used.

[0069] Further, depending on the relative position of the image acquisition unit 200 with respect to the first reflecting member 110, one or more second reflecting members 120 may be provided and the installation angle thereof may be determined.

[0070] In addition, the first reflecting member 110 and the second reflecting member 120 may be supported and installed by one support member 140 to accurately change the light path according to the relative position of the side surface of the tray 20 located in the digital code recognition area RS and the image acquisition unit 200.

[0071] The support member 140 is a member on which the first reflecting member 110 and the second reflecting member 120 are installed, and may be installed so that the first reflecting member 110 and the second reflecting member 120 are fixed, or are rotatable around on a rotation axis (X-axis or a rotation axis parallel to the X-axis in FIG. 3) parallel to the reflection surface for fine adjustment for the light path change.

[0072] In addition, the support member 140 may be installed so that the first reflecting member 110 and the second reflecting member 120 are rotatable around the rotation axis (X-axis or the rotation axis parallel to the X-axis in FIG. 3) parallel to the reflection surface for fine adjustment for the light path change.

[0073] Meanwhile, as described above, the change in shading is severe due to an auxiliary device located near the side surface of the tray 20 located in the digital code recognition area RS, and in this case, there is a problem in that the image acquisition unit 200 does not smoothly recognize the digital code 31 formed on the side surface of the tray

20.

[0074] Accordingly, the digital code recognition system according to the present invention may further include an illuminating unit 130 for illuminating the digital code 31.

[0075] The illuminating unit 130 is a configuration that illuminates the digital code 31 so that the image acquisition unit 200 may smoothly recognize the digital code 31 formed on the side surface of the tray 20, and may be installed on the light transmission path L of the image of the digital code 31 so as to proceed in opposite direction to the transmission direction of the image of the digital code 31 in the light path change unit 100 described above.

[0076] In this case, it is preferable that the illuminating unit 130 is installed so as not to interfere with the transmission of the image of the digital code 31 in the light path change unit 100.

[0077] Meanwhile, the illuminating unit 130 may be installed to illuminate the side surface of the tray 20 located in the digital code recognition area RS, that is, the digital code 31, regardless of the light transmission path L of the image of the digital code 31.

[0078] Specifically, the illuminating unit 130 may be installed to face the digital code 31 formed on the side surface of the tray 30.

[0079] In addition, the light path change unit 100 and the illuminating unit 130 may constitute one module.

[0080] For example, the illuminating unit 130 may be installed to be fixed to the support member 140 described above.

[0081] Meanwhile, the illuminating unit 130 is a configuration that illuminates the digital code 31 to facilitate image acquisition by the image acquisition unit 200, and may have any configuration as long as it may generate light such as a light-emitting diode

(LED).

[0082] Further, the illuminating unit 130 may emit all kinds of light such as red light or white light, and may be configured to emit white light when the image acquisition unit 200 is a CCD camera instead of a scanner.

[0083] Further, the illuminating unit 130 may be any illuminating apparatus if it emits a sufficient amount of light around the digital code 31 to prevent the digital code 31 from being obstructed by the formation of a shadow on the surface of the digital code 31 by a surrounding structure.

[0084] Meanwhile, the digital code recognition system according to the present invention having the above configuration may be installed and used in the device handlers presented in Patent Documents 1 to 7 and the like.

[0085] For example, the device handler according to the present invention is a device handler receiving a plurality of devices 10 by using the tray 20 on which the devices 10 are loaded and performing at least one of inspection and classification on the devices 10, and may include the digital code recognition system having configurations described above, the digital code recognition system recognizing a digital code 31 of the tray 20 located in at least one digital code recognition area RS set on a movement route of the tray 20.

[0086] Here, the device handler may further include a loading unit loading the tray 20 on which the devices 10 on which at least one of inspection and classification is to be performed are loaded and an unloading unit unloading the tray 20 on which the devices 10 on which at least one of inspection and classification has been performed are loaded, and the digital code recognition area RS may be set in at least one of the loading unit and the unloading unit.

[0087] In addition, the unloading unit may use the tray 20 emptied in the loading unit.

[0088] Here, the digital code recognition system is installed in the digital code recognition area RS set on the movement route of the tray 20 in the device handler.

[0089] The digital code recognition area RS may be set at an appropriate position in the device handler in consideration of the movement of the tray 20, that is, the logistics process.

[0090]

[0091] In the above, the preferred embodiment of the present invention has been exemplarily described, but the scope of the present invention is not limited to the specific embodiment, and can be appropriately changed within the scope described in the claims.

CLAIMS

1. A digital code recognition system recognizing a digital code (31) formed on a side surface of a tray (20) on which a plurality of devices (10) are loaded by being installed in a device handler that receives the devices (10) by using the tray (20) and performs at least one of inspection and classification on the devices (10), and recognizing the digital code (31) of the tray (20) located in at least one digital code recognition area (RS) set on a movement route of the tray (20) in the device handler, the digital code recognition system comprising:

a light path change unit (100) installed at a location facing the digital code (31) formed on the side surface of the tray (30) to change a light transmission path (L) of an image of the digital code (31); and

an image acquisition unit (200) recognizing the image of the digital code (31) transmitted by the light path change unit (100).

2. The digital code recognition system of claim 1, wherein the image acquisition unit (200) is located above the tray (20) located in the digital code recognition area (RS), and

the light path change unit (100) includes a first reflecting member (110) for changing the light transmission path (L) upward from the side surface of the tray (30), and a second reflecting member (120) for changing the light transmission path (L) changed by the first reflecting member (110) to the image acquisition unit (200).

3. The digital code recognition system of claim 1, further comprising an

illuminating unit (130) for illuminating the digital code (31).

4. The digital code recognition system of claim 3, wherein the illuminating unit (130) is installed to face the digital code (31) formed on the side surface of the tray (30).

5. The digital code recognition system of claim 3, wherein the light path change unit (100) and the illuminating unit (130) constitute one module.

6. The digital code recognition system of any one of claims 1 to 5, wherein the digital code (31) is at least one of a barcode and a QR code.

7. A device handler receiving a plurality of devices (10) by using a tray (20) on which the devices (10) are loaded and performing at least one of inspection and classification on the devices (10), the device handler comprising:

the digital code recognition system of any one of claims 1 to 5, the digital code recognition system recognizing a digital code (31) of the tray (20) located in at least one digital code recognition area (RS) set on a movement route of the tray (20).

8. The device handler of claim 7, further comprising:

a loading unit loading the tray (20) on which the devices (10) on which at least one of inspection and classification is to be performed are loaded; and

an unloading unit unloading the tray (20) on which the devices (10) on which at least one of inspection and classification has been performed are loaded,

wherein the digital code recognition area (RS) is set in at least one of the loading unit and the unloading unit.

9. The device handler of claim 8, wherein the unloading unit uses the tray (20) emptied in the loading unit.

10. The device handler of claim 7, wherein the digital code (31) is at least one of a barcode and a QR code.