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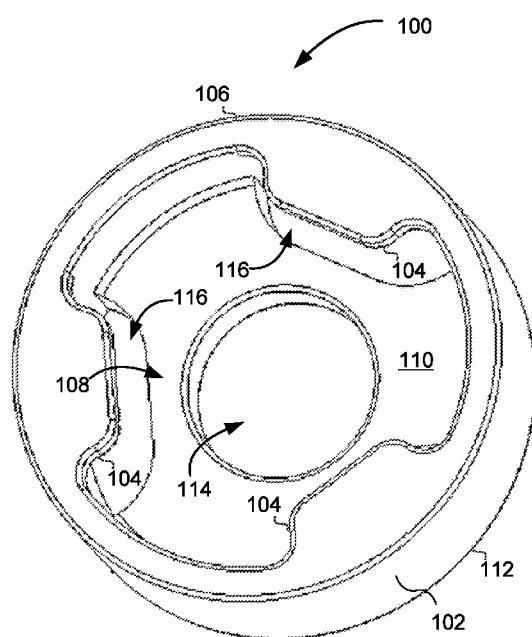


FIG. 1A

(57) Abstract: A computer system board protector (100) devices and related assemblies, configurations, and systems (400) The computer system board protector (100) includes a wall (102) that extends circumferentially about an axis to form an open circular cylinder, a plurality of retention protrusions (104) that extend inwardly from a first end (106) of the wall (102), with a central gap (108) disposed between the plurality of retention protrusions (104) sized for passage of a mount element fastener there through along the axis, and a base (110) that extends inwardly from a second end (112) of the wall (102), where the base (110) includes a central opening (114) sized for passage of a threaded back plate post there through along the axis to couple with the mount element fastener, where the central opening (114) of the base (110) is smaller than the central gap (108) between the plurality of retention protrusion (104).

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BOARD PROTECTOR FOR HEATSINK OR INTEGRATED LOADING MECHANISM ASSEMBLIES

Field

Embodiments of the present disclosure generally relate to the field of computing
5 and, more particularly, to computer system board protectors and related assemblies,
configurations, and systems.

Background

In legacy computer systems, copper wear pads are typically used for board
protection near the retention holes for retaining a heatsink or an integrated loading
10 mechanism (ILM) on a computer system board. However, these copper wear pads are not
compatible with routing board traces, such as double data rate (DDR) memory traces, near
the retention holes as may be required by the space constraints for routing board traces in
some computer systems.

Brief Description of the Drawings

15 Embodiments of the board protector for heatsink and integrated loading
mechanism assemblies of the present disclosure may overcome these limitations. The
techniques will be readily understood by the following detailed description in conjunction
with the accompanying drawings. To facilitate this description, like reference numerals
designate like structural elements. Embodiments are illustrated by way of example, and
20 not by way of limitation, in the figures of the accompanying drawings.

Figure 1A schematically illustrates a computer system board protector, according
to various embodiments.

Figure 1B schematically illustrates another view of the computer system board
protector shown in Fig. 1A, according to various embodiments.

25 Figure 2 schematically illustrates a partially assembled fastener assembly having a
fastener with a computer system board protector, according to various embodiments.

Figure 3 schematically illustrates a partial cross-sectional view of a mounting
assembly that includes a computer system board protector, according to various
embodiments.

30 Figure 4 schematically illustrates a partial cross-sectional view of a mounting
assembly coupled with a computer system board and backplate, according to various
embodiments.

Figure 5 schematically illustrates a partial view of a computer system board showing board traces passing proximate a retention hole area, according to various embodiments.

Figure 6 schematically illustrates a partial view of an integrated loading
5 mechanism coupled with a computer system board, according to various embodiments.

Detailed Description

Embodiments of the present disclosure describe computer system board protector devices and related assemblies, configurations, and systems. In various embodiments, a
10 computer system board protector may include a wall that extends circumferentially about an axis to form an open circular cylinder, a plurality of retention protrusions that extend inwardly from a first end of the wall, with a central gap disposed between the plurality of retention protrusions sized for passage of a mount element fastener (e.g., a heatsink or integrated loading mechanism (ILM) fastener) therethrough along the axis, and a base that
15 extends inwardly from a second end of the wall, where the base includes a central opening sized for passage of a threaded backplate post therethrough along the axis to couple with the mount element fastener, where the central opening of the base is smaller than the central gap between the plurality of retention protrusions. In various embodiments, one or more mount element fasteners may be used to secure a mount element (e.g., a heatsink, an
20 ILM, or some other mount element) to another structure such as a computer system board.

In the following description, various aspects of the illustrative implementations will be described using terms commonly employed by those skilled in the art to convey the substance of their work to others skilled in the art. However, it will be apparent to those skilled in the art that embodiments of the present disclosure may be practiced with
25 only some of the described aspects. For purposes of explanation, specific numbers, materials, and configurations are set forth in order to provide a thorough understanding of the illustrative implementations. It will be apparent to one skilled in the art that embodiments of the present disclosure may be practiced without the specific details. In other instances, well-known features are omitted or simplified in order
30 not to obscure the illustrative implementations.

In the following detailed description, reference is made to the accompanying drawings that form a part hereof, wherein like numerals designate like parts throughout, and in which is shown by way of illustration embodiments in which the subject matter of the present disclosure may be practiced. It is to be understood that other

embodiments may be utilized and structural or logical changes may be made without departing from the scope of the present disclosure. Therefore, the following detailed description is not to be taken in a limiting sense, and the scope of embodiments is defined by the appended claims and their equivalents.

5 For the purposes of the present disclosure, the phrase “A and/or B” means (A), (B), or (A and B). For the purposes of the present disclosure, the phrase “A, B, and/or C” means (A), (B), (C), (A and B), (A and C), (B and C), or (A, B, and C).

 The description may use perspective-based descriptions such as top/bottom, in/out, over/under, and the like. Such descriptions are merely used to facilitate the discussion and
10 are not intended to restrict the application of embodiments described herein to any particular orientation.

 The description may use the phrases “in an embodiment,” or “in embodiments,” which may each refer to one or more of the same or different embodiments. Furthermore, the terms “comprising,” “including,” “having,” and the like, as used with respect to
15 embodiments of the present disclosure, are synonymous.

 The term “coupled with,” along with its derivatives, may be used herein. “Coupled” may mean one or more of the following. “Coupled” may mean that two or more elements are in direct physical or electrical contact. However, “coupled” may also mean that two or more elements indirectly contact each other, but yet still cooperate or
20 interact with each other, and may mean that one or more other elements are coupled or connected between the elements that are said to be coupled with each other. The term “directly coupled” may mean that two or more elements are in direct contact.

 Figure 1A schematically illustrates a computer system board protector 100, according to various embodiments. Figure 1B schematically illustrates another view of the
25 computer system board protector 100 shown in Fig. 1A, according to various embodiments. In some embodiments, the computer system board protector 100 may include a wall 102 that may extend circumferentially about an axis, not shown for clarity, to form an open circular cylinder (with the axis passing through a center of the open circular cylinder). In various embodiments, the computer system board protector 100 may
30 include one or more retention protrusions 104 that may extend inwardly from a first end 106 of the wall 102 toward the axis. In some embodiments, the computer system board protector 100 may include three retention protrusions 104 as shown, with a central gap 108 disposed between the retention protrusions 104 sized for passage of a mount element

fastener (e.g., a heatsink or integrated loading mechanism (ILM) fastener) therethrough along the axis.

In various embodiments, the computer system board protector 100 may include a base 110 that extends inwardly from a second end 112 of the wall 102 toward the axis. In some embodiments, the base 110 may include a central opening 114 sized for passage of a threaded backplate post therethrough along the axis to couple with the mount element fastener. In various embodiments, the central opening 114 of the base 110 may be smaller than the central gap 108 between the retention protrusions 104. In some embodiments, the base 110 may include one or more additional openings 116. In various embodiments, the computer system board protector 100 may be formed of a polymer material (e.g., a non-conductive plastic). However, the computer system board protector 100 may be formed of any other suitable material (e.g., another non-conductive material such as rubber).

Figure 2 schematically illustrates a partially assembled fastener assembly 200 having a fastener 202 with a computer system board protector (e.g., computer system board protector 100 of Figs. 1A and 1B), according to various embodiments. In some embodiments, the fastener 202 may be a screw having a groove 204 to receive and/or couple with a retainer 206 (e.g., an E-type or a C-type retention clip). In various embodiments, the fastener 202 may be a mount element fastener (e.g., a heatsink or ILM fastener) and/or may be formed of metal. In some embodiments, the fastener 202 may include a head 208.

Figure 3 schematically illustrates a partial cross-sectional view of a mounting assembly 300 that includes a computer system board protector 302, according to various embodiments. In some embodiments, the computer system board protector 302 may be structured in similar or the same fashion as that described with respect to the computer system board protector 100 of Figs. 1 and 2. In various embodiments, the mounting assembly 300 may include a fastener 304 and a mount element 306 (e.g., a heatsink or an integrated loading mechanism (ILM)) having an opening (e.g., a hole) to receive the fastener 304. In various embodiments, the fastener 304 may be structured in similar fashion to the fastener 202 of Fig. 2 and may extend into the computer system board protector 302. As shown, the mount element 306 may be a heatsink in some embodiments.

In some embodiments, the mounting assembly 300 may include a retainer 308 (e.g., an E-type or a C-type retention clip) that may be coupled with a groove in the fastener 304 to retain the computer system board protector 302 on the fastener 304. In various embodiments, the mounting assembly 300 may include a fastener cup 310 coupled

with the mount element 306. In some embodiments, the fastener cup 310 may be located within the opening to receive the fastener 304 and the fastener 304 may pass through the fastener cup 310. In some embodiments, the fastener cup 310 may not be included or may be an integral structure of the mount element 306.

5 In various embodiments, the fastener 304 may include an internally threaded region 312. In some embodiments, an end 314 of the fastener 304 may have an outer diameter larger than a central opening 316 in a base 318 of the computer system board protector 302 such that the fastener 304 will not pass through the central opening 316. In various embodiments, the central opening 316 may correspond to the central opening 114
10 of Fig. 1. Although a single computer system board protector 302, fastener 304, retainer 308, and fastener cup 310 are shown for clarity, it should be understood that additional such components may be included in the mounting assembly 300 in various embodiments.

Figure 4 schematically illustrates a partial cross-sectional view of a computer system 400 having the mounting assembly 300 coupled with a computer system board 404
15 and a backplate 406, according to various embodiments. In some embodiments, the mounting assembly 300 may be assembled before coupling with the computer system board 404 and backplate 406. In various embodiments, the retainer 308 may keep the computer system board protector 302 coupled with the mount element 306 of the mounting assembly 300 such that it may remain locked to the mount element 306 through
20 multiple assembly and disassembly cycles of coupling to the computer system board 404 and backplate 406, or when being moved to another computer system board and/or backplate.

In some embodiments, the computer system 400 may include a threaded backplate post 408 extending from the backplate 406 through a mounting hole in the computer
25 system board 404 and into the computer system board protector 302 through the central opening 316, not labeled for clarity in Fig. 4, but labeled in Fig. 3. In various embodiments, the threaded backplate post 408 may be externally threaded, and may couple with the fastener 304 by extending into and coupling with the internally threaded region 312 of the fastener 304. However, it should be understood that the fastener 304 may
30 couple with the backplate post 408 in any suitable manner in other embodiments.

In some embodiments, the computer system 400 may include one or more springs 410. In various embodiments, the spring 410 may have an outer diameter smaller than an inner diameter of the fastener cup 310 such that the spring 410 may be located at least partially within the fastener cup 310. Although the spring 410 was not shown in Fig. 3, the

mounting assembly 300 may include one or more springs 410 in various embodiments. In some embodiments, spring 410 may have an inner diameter larger than a shaft diameter of the fastener 304 such that the fastener 304 may pass through the spring 410. In various embodiments, the fastener 304 may include a head 412 having a head diameter larger than
5 the inner diameter of the spring 410 such that the head 412 will not pass through the spring 410 and will compress the spring 410 between the head 412 and a surface of the fastener cup 310 when tightened.

Figure 5 schematically illustrates a partial view of a computer system board 500 showing board traces 502 passing proximate a retention hole area 504, according to
10 various embodiments. In some embodiments, one or more of the board traces 502 may be memory traces (e.g., double data rate (DDR) memory traces) that may pass adjacent to the retention hole area 504. In some embodiments, one or more of the board traces 502 may pass through the retention hole area 504. Although the board traces 502 are not shown as passing into the retention hole area 504 for clarity, in various embodiments one or more of
15 the board traces 502 may pass through the retention hole area 504 and in some embodiments may pass adjacent to a retention hole 506 in the retention hole area 504. In various embodiments, the retention hole area 504 may correspond to a region of the computer system board 500 over which a portion or all of a computer system board protector (e.g., computer system board protector 100 or 302 of Figs. 1-4) may be
20 positioned and/or the retention hole 506 may correspond to a mounting hole in the computer system board 500 for passage of a backplate post (e.g., threaded backplate post 408).

Figure 6 schematically illustrates a partial view of an integrated loading mechanism (ILM) 600 coupled with a computer system board 602, according to various
25 embodiments. In some embodiments, one or more ILM fasteners 604 may couple the ILM to the computer system board 602 in a manner similar to that shown and described with respect to the computer system 400 of Fig. 4, with the ILM 600 corresponding to the mount element 306 and the computer system board 602 corresponding to the computer system board 404 and/or 500. In various embodiments, a plurality of ILM fasteners 604,
30 such as the four fasteners shown, may be used to couple the ILM 600 to the computer system board 602.

EXAMPLES

Example 1 may include a computer system board protector comprising: a wall that extends circumferentially about an axis to form an open circular cylinder; and a plurality of retention protrusions that extend inwardly from a first end of the wall toward the axis, with a central gap disposed between the plurality of retention protrusions sized for passage of a mount element fastener therethrough along the axis; and a base that extends inwardly from a second end of the wall toward the axis, wherein the base includes a central opening sized for passage of a threaded backplate post therethrough along the axis to couple with the mount element fastener, wherein the central opening of the base is smaller than the central gap between the plurality of retention protrusions.

Example 2 may include the subject matter of Example 1, wherein the central opening is sized such that the mount element fastener will not pass therethrough along the axis.

Example 3 may include the subject matter of any one of Examples 1-2, wherein the plurality of retention protrusions includes three retention protrusions spaced approximately equally along the wall.

Example 4 may include the subject matter of any one of Examples 1-3, wherein the base includes one or more additional openings.

Example 5 may include the subject matter of Example 4, wherein the one or more additional openings are positioned approximately opposite the plurality of retention protrusions.

Example 6 may include the subject matter of any one of Examples 1-5, wherein the wall, the retention protrusions, and the base are formed of a non-conductive material.

Example 7 may include the subject matter of Example 6, wherein the non-conductive material is a polymer.

Example 8 may include the subject matter of Example 6, wherein the non-conductive material is rubber.

Example 9 may include a mounting assembly comprising: a fastener; a mount element having a hole to receive the fastener, wherein the mount element is a heatsink or an integrated loading mechanism (ILM); a computer system board protector, wherein the fastener extends into the computer system board protector; and a retainer to retain the board protector on the fastener.

Example 10 may include the subject matter of Example 9, wherein the computer system board protector includes: a wall that extends circumferentially about an axis to

form an open circular cylinder; and a plurality of retention protrusions that extend inwardly from a first end of the wall toward the axis, with a central gap disposed between the plurality of retention protrusions sized for passage of the fastener therethrough along the axis; and a base that extends inwardly from a second end of the wall toward the axis, wherein the base includes a central opening sized for passage of a threaded backplate post therethrough along the axis to couple with the fastener, wherein the central opening of the base is smaller than the central gap between the plurality of retention protrusions.

Example 11 may include the subject matter of any one of Examples 9-10, wherein the fastener includes a groove and the retainer is an E-type or a C-type retention clip coupled with the groove.

Example 12 may include the subject matter of any one of Examples 9-11, further comprising a fastener cup coupled with the mount element, wherein the fastener cup is located within the hole to receive the fastener and the fastener passes through the fastener cup.

Example 13 may include the subject matter of Example 12, further comprising a spring having an outer diameter smaller than an inner diameter of the fastener cup, wherein an inner diameter of the spring is larger than a shaft diameter of the fastener and smaller than a head diameter of the fastener, wherein the fastener passes through the spring.

Example 14 may include the subject matter of any one of Examples 9-13, wherein the fastener is a first fastener, the hole is a first hole, the board protector is a first board protector, the retainer is a first retainer, and the mounting assembly further includes: one or more additional fasteners, wherein the mount element includes one or more additional holes to receive the one or more additional fasteners; one or more additional board protectors coupled with the one or more additional fasteners; and one or more additional retainers to retain the one or more additional board protectors on the one or more additional fasteners.

Example 15 may include the subject matter of any one of Examples 10-14, wherein the central opening is sized such that the fastener will not pass therethrough along the axis.

Example 16 may include the subject matter of any one of Examples 9-15, wherein the computer system board protector is formed of a polymer material.

Example 17 may include the subject matter of any one of Examples 9-16, wherein the fastener is internally threaded.

Example 18 may include a computer system comprising: a computer system board having one or more mounting holes for mounting a heatsink or an integrated loading mechanism (ILM), wherein the computer system board includes one or more conductive computer memory signal routing traces that run through a region of the computer system board adjacent to the one or more mounting holes; a mount element, wherein the mount element is a heatsink or an ILM; one or more fasteners coupled with the mount element; one or more computer system board protectors located adjacent to the computer system board between the mount element and the computer system board, wherein the one or more fasteners extend into a first end of the one or more computer system board protectors; and a backplate having one or more threaded backplate posts that extend through the mounting holes into a second end of the one or more computer system board protectors, wherein the one or more threaded backplate posts are coupled with the one or more fasteners.

Example 19 may include the subject matter of Example 18, wherein the one or more computer system board protectors include: a wall that extends circumferentially about an axis to form an open circular cylinder; and a plurality of retention protrusions that extend inwardly from a first end of the wall toward the axis, with a central gap disposed between the plurality of retention protrusions sized for passage of the one or more fasteners therethrough along the axis; and a base that extends inwardly from a second end of the wall toward the axis, wherein the base includes a central opening sized for passage of the one or more threaded backplate posts therethrough along the axis to couple with the one or more fasteners, wherein the central opening of the base is smaller than the central gap between the plurality of retention protrusions.

Example 20 may include the subject matter of any one of Examples 18-19, wherein one or more of the one or more board protectors are positioned between one or more of the one or more conductive computer memory signal routing traces and the mount element.

Example 21 may include the subject matter of any one of Examples 18-20, wherein the one or more fasteners are internally threaded and the one or more threaded backplate posts are externally threaded.

Example 22 may include the subject matter of any one of Examples 18-21, further comprising one or more retention clips, wherein one or more of the one or more fasteners include a retention groove formed therein and the one or more retention clips are coupled with a corresponding retention groove.

Example 23 may include the subject matter of Example 22, wherein the retention clips are E-clips.

Example 24 may include the subject matter of any one of Examples 18-23, wherein the one or more computer system board protectors are formed of a polymer material.

5 Example 25 may include the subject matter of any one of Examples 19-24, wherein the central openings of the one or more computer system board protector bases are sized such that the one or more fasteners will not pass therethrough along the axis.

10 Example 26 may include the subject matter of any one of Examples 18-25, further comprising: one or more fastener cups coupled with the mount element; and one or more springs located at least partially within one or more of the one or more fastener cups, wherein one or more of the one or more fasteners pass through one or more of the one or more springs.

15 Although certain embodiments have been illustrated and described herein for purposes of description, a wide variety of alternate and/or equivalent embodiments or implementations calculated to achieve the same purposes may be substituted for the embodiments shown and described without departing from the scope of the present disclosure. This application is intended to cover any adaptations or variations of the embodiments discussed herein. Therefore, it is manifestly intended that embodiments described herein be limited only by the claims.

20 Where the disclosure recites “a” or “a first” element or the equivalent thereof, such disclosure includes one or more such elements, neither requiring nor excluding two or more such elements. Further, ordinal indicators (e.g., first, second or third) for identified elements are used to distinguish between the elements, and do not indicate or imply a required or limited number of such elements, nor do they indicate a particular position or
25 order of such elements unless otherwise specifically stated.

Claims

What is claimed is:

1. A computer system board protector comprising:
 - a wall that extends circumferentially about an axis to form an open circular
 - 5 cylinder; and
 - a plurality of retention protrusions that extend inwardly from a first end of the wall toward the axis, with a central gap disposed between the plurality of retention protrusions sized for passage of a mount element fastener therethrough along the axis; and
 - a base that extends inwardly from a second end of the wall toward the axis,
 - 10 wherein the base includes a central opening sized for passage of a threaded backplate post therethrough along the axis to couple with the mount element fastener, wherein the central opening of the base is smaller than the central gap between the plurality of retention protrusions.
2. The computer system board protector of claim 1, wherein the central opening is sized
- 15 such that the mount element fastener will not pass therethrough along the axis.
3. The computer system board protector of any one of claims 1-2, wherein the plurality of retention protrusions includes three retention protrusions spaced approximately equally along the wall.
4. The computer system board protector of any one of claims 1-2, wherein the base
- 20 includes one or more additional openings.
5. The computer system board protector of claim 4, wherein the one or more additional openings are positioned approximately opposite the plurality of retention protrusions.
6. The computer system board protector of any one of claims 1-2, wherein the wall, the retention protrusions, and the base are formed of a non-conductive material.
- 25 7. The computer system board protector of claim 6, wherein the non-conductive material is a polymer.
8. The computer system board protector of claim 6, wherein the non-conductive material is rubber.
9. A mounting assembly comprising:

a fastener;

a mount element having a hole to receive the fastener, wherein the mount element is a heatsink or an integrated loading mechanism (ILM);

a computer system board protector, wherein the fastener extends into the computer
5 system board protector; and

a retainer to retain the board protector on the fastener.

10. The mounting assembly of claim 9, wherein the computer system board protector includes:

a wall that extends circumferentially about an axis to form an open circular
10 cylinder; and

a plurality of retention protrusions that extend inwardly from a first end of the wall toward the axis, with a central gap disposed between the plurality of retention protrusions sized for passage of the fastener therethrough along the axis; and

a base that extends inwardly from a second end of the wall toward the axis,
15 wherein the base includes a central opening sized for passage of a threaded backplate post therethrough along the axis to couple with the fastener, wherein the central opening of the base is smaller than the central gap between the plurality of retention protrusions.

11. The mounting assembly of claim 10, wherein the fastener includes a groove and the retainer is an E-type or a C-type retention clip coupled with the groove.

20 12. The mounting assembly of claim 10, further comprising a fastener cup coupled with the mount element, wherein the fastener cup is located within the hole to receive the fastener and the fastener passes through the fastener cup.

13. The mounting assembly of claim 12, further comprising a spring having an outer diameter smaller than an inner diameter of the fastener cup, wherein an inner diameter of
25 the spring is larger than a shaft diameter of the fastener and smaller than a head diameter of the fastener, wherein the fastener passes through the spring.

14. The mounting assembly of any one of claims 10-13, wherein the fastener is a first fastener, the hole is a first hole, the board protector is a first board protector, the retainer is a first retainer, and the mounting assembly further includes:

one or more additional fasteners, wherein the mount element includes one or more additional holes to receive the one or more additional fasteners;

one or more additional board protectors coupled with the one or more additional fasteners; and

5 one or more additional retainers to retain the one or more additional board protectors on the one or more additional fasteners.

15. The mounting assembly of any one of claims 10-13, wherein the central opening is sized such that the fastener will not pass therethrough along the axis.

16. The mounting assembly of any one of claims 9-13, wherein the computer system
10 board protector is formed of a polymer material.

17. The mounting assembly of any one of claims 9-13, wherein the fastener is internally threaded.

18. A computer system comprising:

15 a computer system board having one or more mounting holes for mounting a heatsink or an integrated loading mechanism (ILM), wherein the computer system board includes one or more conductive computer memory signal routing traces that run through a region of the computer system board adjacent to the one or more mounting holes;

 a mount element, wherein the mount element is a heatsink or an ILM;

 one or more fasteners coupled with the mount element;

20 one or more computer system board protectors located adjacent to the computer system board between the mount element and the computer system board, wherein the one or more fasteners extend into a first end of the one or more computer system board protectors; and

25 a backplate having one or more threaded backplate posts that extend through the mounting holes into a second end of the one or more computer system board protectors, wherein the one or more threaded backplate posts are coupled with the one or more fasteners.

19. The computer system of claim 18, wherein the one or more computer system board protectors include:

a wall that extends circumferentially about an axis to form an open circular cylinder; and

a plurality of retention protrusions that extend inwardly from a first end of the wall toward the axis, with a central gap disposed between the plurality of retention protrusions
5 sized for passage of the one or more fasteners therethrough along the axis; and

a base that extends inwardly from a second end of the wall toward the axis, wherein the base includes a central opening sized for passage of the one or more threaded backplate posts therethrough along the axis to couple with the one or more fasteners, wherein the central opening of the base is smaller than the central gap between the
10 plurality of retention protrusions.

20. The computer system of claim 18, wherein one or more of the one or more board protectors are positioned between one or more of the one or more conductive computer memory signal routing traces and the mount element.

21. The computer system of any one of claims 18-19, wherein the one or more fasteners
15 are internally threaded and the one or more threaded backplate posts are externally threaded.

22. The computer system of any one of claims 18-19, further comprising one or more retention clips, wherein one or more of the one or more fasteners include a retention groove formed therein and the one or more retention clips are coupled with a
20 corresponding retention groove.

23. The computer system of claim 21, wherein the retention clips are E-clips.

24. The computer system of claim 19, wherein the central openings of the one or more computer system board protector bases are sized such that the one or more fasteners will not pass therethrough along the axis.

25. The computer system of any one of claims 18-19, further comprising:

one or more fastener cups coupled with the mount element; and

one or more springs located at least partially within one or more of the one or more fastener cups, wherein one or more of the one or more fasteners pass through one or more
30 of the one or more springs.

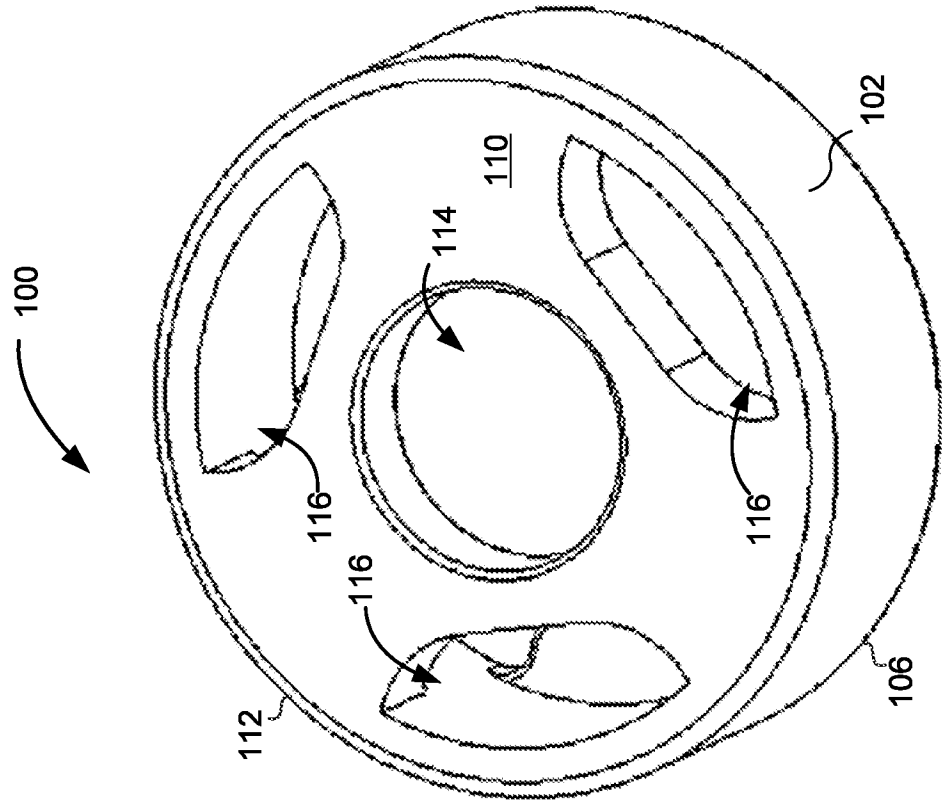


FIG. 1B

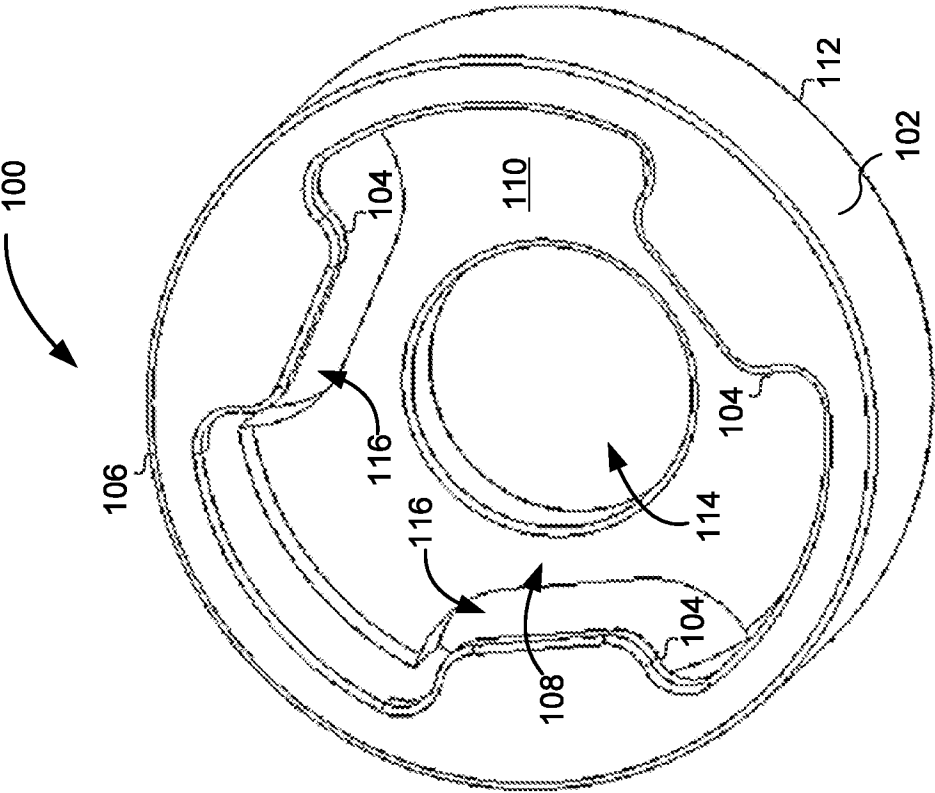


FIG. 1A

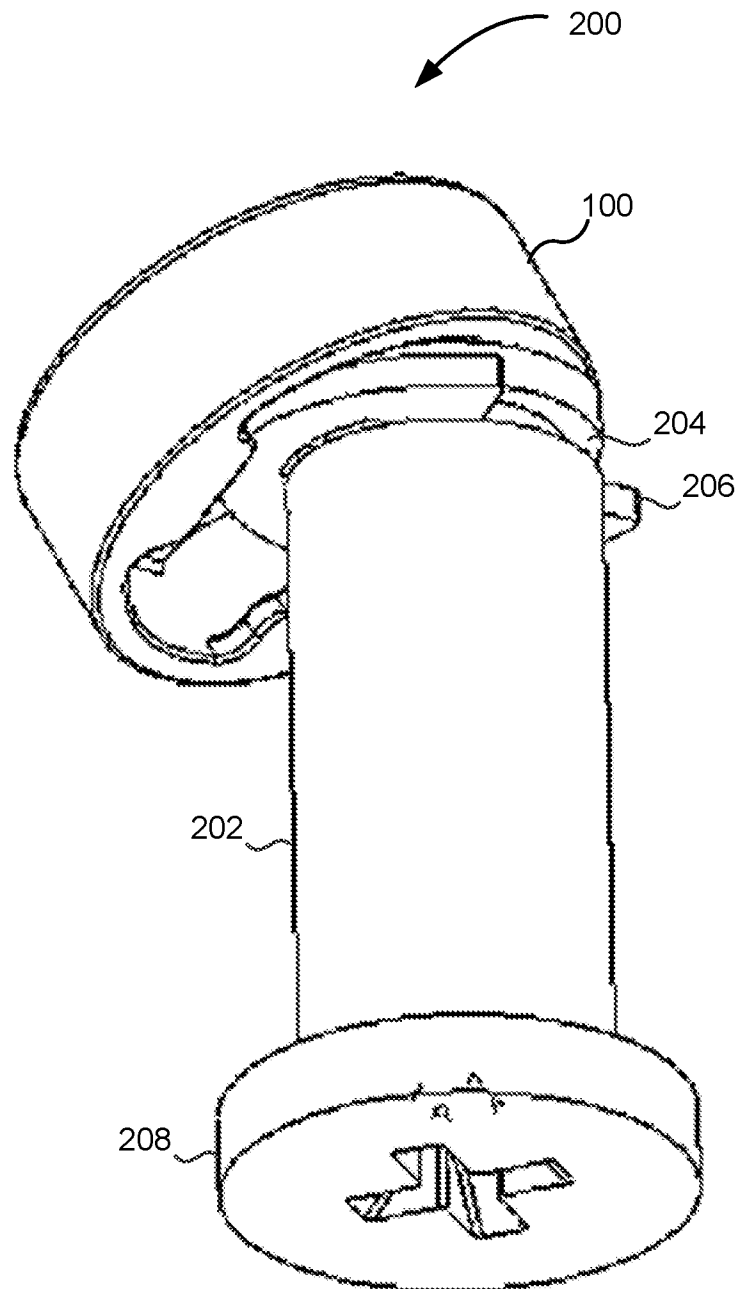


FIG. 2

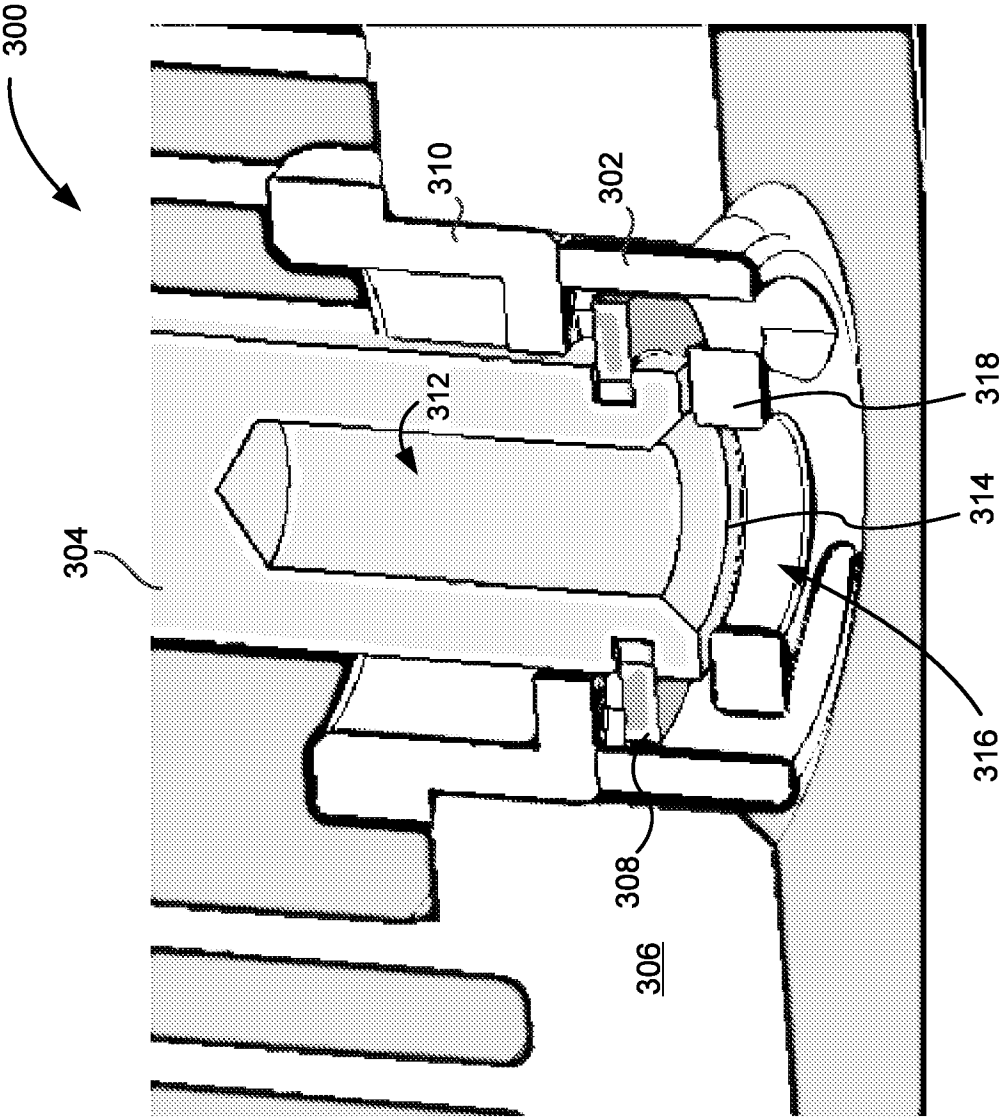


FIG. 3

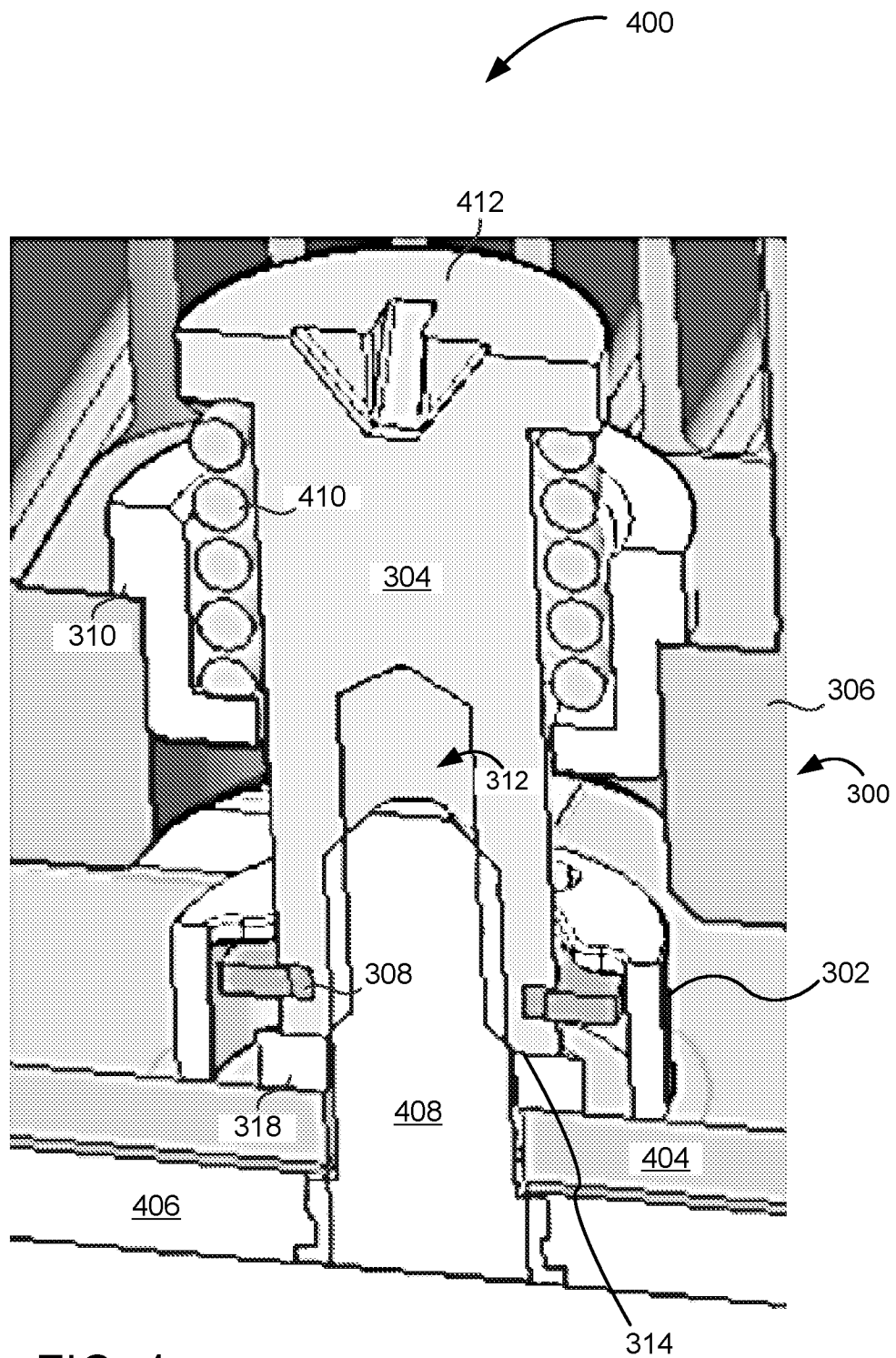


FIG. 4

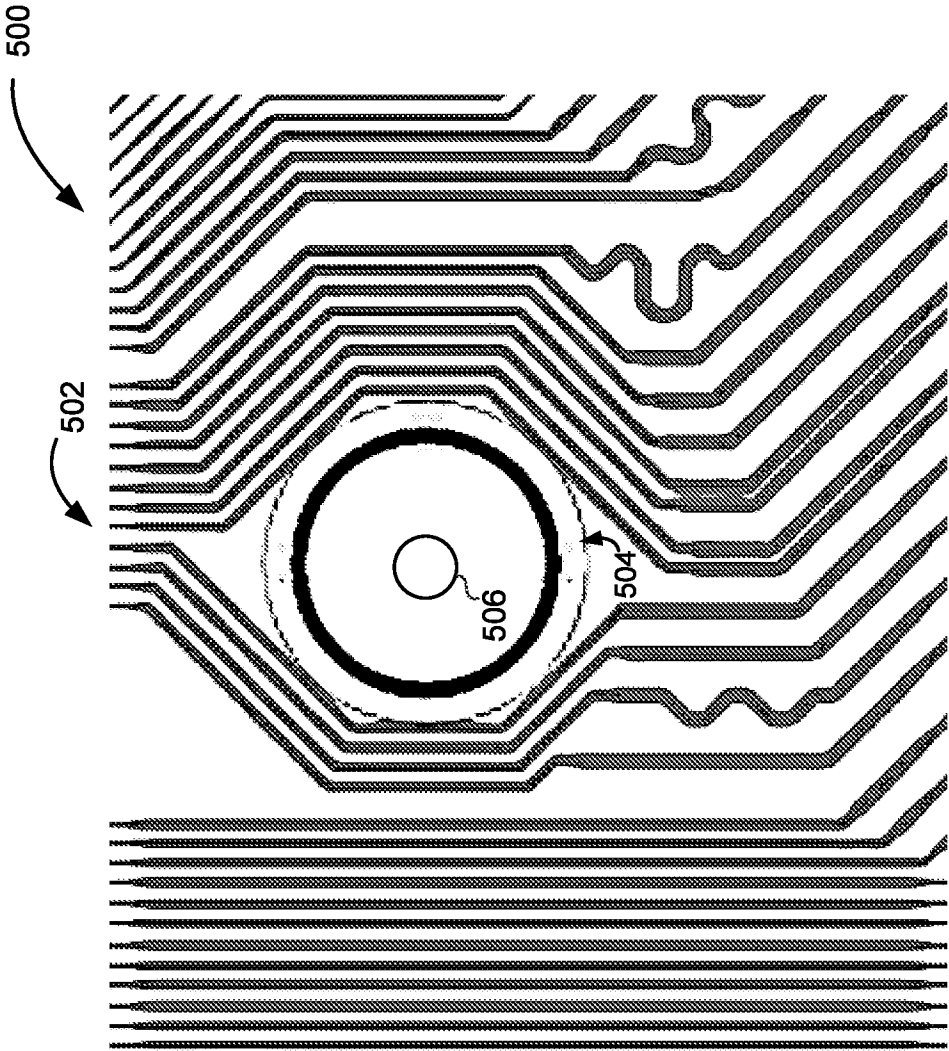


FIG. 5

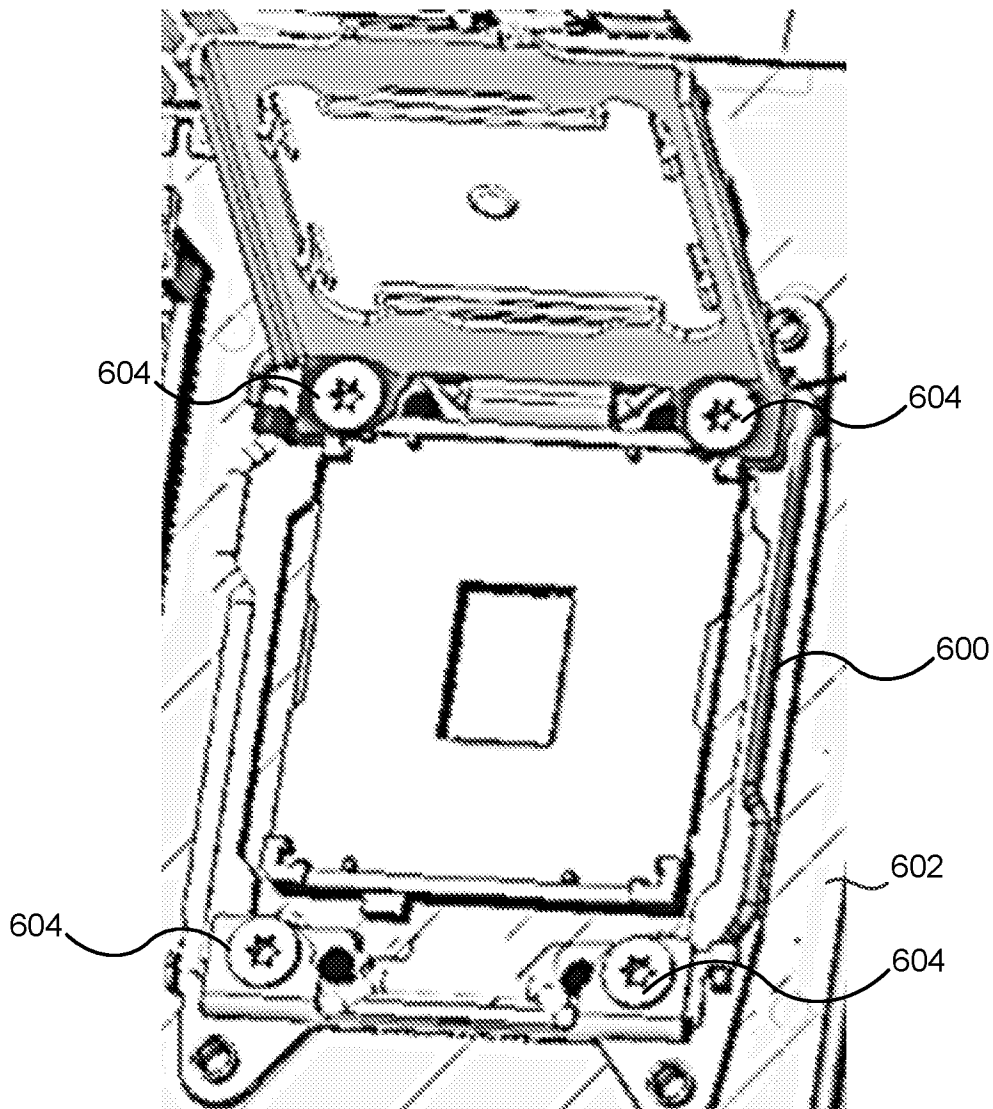


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2017/083700

A. CLASSIFICATION OF SUBJECT MATTER

H05K 5/02(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H05K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT,CNKI,WPI,EPODOC:computer, system, board,protector, wall, open, protrusion, integrat+, load+, mechanism, ILM

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2007069754 A1 (INTERNATIONAL BUSINESS MACHINES CORPORATION) 29 March 2007 (2007-03-29) description, paragraphs [0027]-[0030] and figures 1A-3	1-25
A	CN 203151903 U (SHANGHAI HENGRUI MEASUREMENT & CONTROL) 21 August 2013 (2013-08-21) the whole document	1-25
A	CN 104427749 A (SAMSUNG ELECTRO-MECHANICS CO.) 18 March 2015 (2015-03-18) the whole document	1-25
A	CN 201846524 U (FUJIAN LANDI COMML. EQUIP. CO., LTD.) 25 May 2011 (2011-05-25) the whole document	1-25
A	US 6819099 B1 (INTEL CORPORATION) 16 November 2004 (2004-11-16) the whole document	1-25

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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“&” document member of the same patent family

Date of the actual completion of the international search

19 January 2018

Date of mailing of the international search report

09 February 2018

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2017/083700

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
US	2007069754	A1	29 March 2007	US	7930820	B2	26 April 2011
CN	203151903	U	21 August 2013	None			
CN	104427749	A	18 March 2015	JP	2015050455	A	16 March 2015
				KR	20150026569	A	11 March 2015
CN	201846524	U	25 May 2011	None			
US	6819099	B1	16 November 2004	None			