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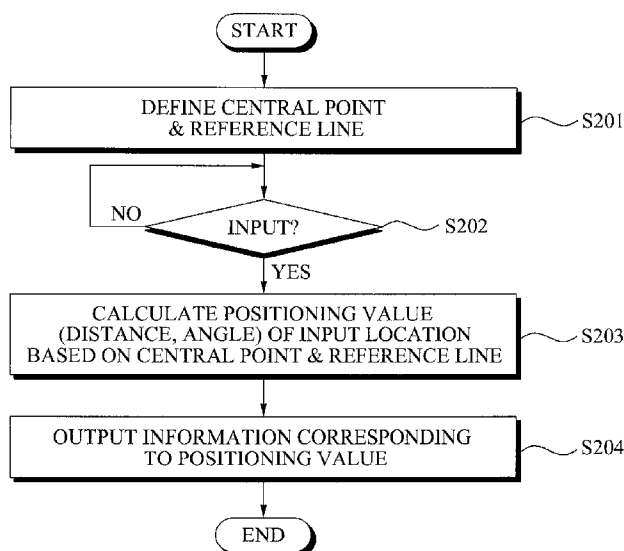
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(54) Title: POSITIONING METHOD OF TOUCH SCREEN PANEL AND APPARATUS FOR EXECUTING THE METHOD

FIG. 2



(57) Abstract: A positioning method of a touch screen panel and an apparatus for executing the method are provided. The positioning method includes: calculating a distance and an angle with respect to a contact location when an external contact occurs in a touch region of a predetermined shape; and recognizing the calculated distance and the angle as a positioning value of the contact location.

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POSITIONING METHOD OF TOUCH SCREEN PANEL AND APPARATUS
FOR EXECUTING THE METHOD

Technical Field

5 The present invention relates to a touch screen panel, and more particularly, to a positioning method of a touch screen panel that can readily perform positioning and variously design a panel shape, and an apparatus for executing the method.

Background Art

10 Generally, a touch screen panel is a pointing device in a planar shape. The touch screen panel is also referred to as a touch pad or a track pad.

 The touch screen panel is used as an input device for various types of electrical and electronic products such as a computer and the like. The touch screen panel enables information corresponding to a contact location to be input when a user contacts
15 a screen.

 The existing touch screen panel has been widely used as an input device in various types of fields due to its convenience. The touch screen panel may be classified into a resistive type, an ultrasonic type, an optical type, and the like, depending on an input style.

20 The touch screen panel is installed in a display screen of an image display device such as a liquid crystal display (LCD), a cathode ray type (CRT), a plasma display panel (PDP), an electroluminescence (EL), and the like. While viewing the display screen of the image display device, a user may contact a predetermined location of the touch screen panel according to information that the user desires to view.

25 For example, a touch screen is installed in a monitor of an automatic transaction machine (ATM) of a bank. The user may touch a predetermined location of the screen according to a guideline displayed on the monitor and thereby input information according to the contact location. In response to the input, the ATM may perform a predetermined operation.

30 FIG. 1 is a diagram for describing a method of recognizing coordinates according to a contact location of a user on a conventional touch screen panel.

 As shown in FIG. 1, in the conventional touch screen panel, a panel

corresponding to a touch region 101 is formed in a square shape. When the user contacts a location P1 in the touch region 101, the touch screen panel may determine coordinates (x, y) where the contact occurs and recognize the coordinates (x, y) as a positioning value of the contact location.

5 Specifically, the region 101 may recognize positioning of the contact location P1 of the user within minimum coordinates (0, 0) and maximum coordinates (A, B) based on an X axis and a Y axis, according to the coordinates (x, y) and may receive, as a user command, information that is predetermined according to the corresponding coordinates.

10 However, in the conventional touch screen panel, positioning of a contact location may be measured according to coordinates and thus there is some constraint on designing a panel shape.

 Also, when the image display device is manufactured in various shapes, it is difficult to set reference coordinates of a touch screen panel and also difficult to
15 measure positioning of a contact location.

 The touch screen panel using the existing positioning method may not be manufactured to match the shape of the image display device. Accordingly, when a panel has a different shape from the image display device, there may be a region where a user contact does not occur. Also, invalid coordinates may increase.

20

Disclosure of Invention

Technical Goals

 An aspect of the present invention provides a positioning method and apparatus of a touch screen panel that can variously design a panel shape.

25 Another aspect of the present invention provides a new positioning method for recognizing a user contact location, and also provides a positioning method and apparatus of a touch screen panel that can reduce an invalid region of a panel.

Technical solutions

30 According to an aspect of the present invention, there is provided a positioning method of a touch screen panel, the method including: calculating a distance and an angle with respect to a contact location when an external contact occurs in a touch

region of a predetermined shape; and recognizing the calculated distance and the angle as a positioning value of the contact location.

In this instance, the touch region may be formed in a polygonal shape or a circular shape that includes at least three lines.

5 Also, the calculating may include: calculating a distance between the contact location and the central point based on the reference line; and calculating an angle between the reference line and a line that is extended from the contact location to the central point, based on the reference line.

10 According to another aspect of the present invention, there is provided a positioning apparatus of a touch screen panel, the apparatus including: a panel unit to include a touch region of a predetermined shape; and a positioning value calculator to calculate a distance and an angle with respect to a contact location when an external contact occurs in the touch region, and to recognize the calculated distance and the angle as a positioning value of the contact location.

15

Advantageous Effect

According to embodiments of the present invention, there is provided a positioning method that can recognize a user contact location using a distance and an angle, and thereby enabling more simple and easy positioning for the contact location.

20

A positioning method according to embodiments of the present invention may reduce an invalid region of a panel and more variously design a panel shape. Also, although a shape or location of a panel is changed, correction for positioning may be more readily performed. Accordingly, it is possible to expand the product application and improve a usage convenience.

25

Brief Description of Drawings

FIG. 1 is a diagram for describing a positioning method of a contact location in a conventional touch screen panel;

30

FIG. 2 is a flowchart illustrating a positioning method of a touch screen panel according to an embodiment of the present invention;

FIG. 3 is a diagram for describing a positioning method using a distance and an angle of a contact location in a touch screen panel according to an embodiment of the

present invention; and

FIG. 4 is a diagram illustrating a configuration of a positioning apparatus of a touch screen panel according to an embodiment of the present invention.

5 Best Mode for Carrying Out the Invention

Reference will now be made in detail to embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The embodiments are described below in order to explain the present invention by referring to the figures.

10 A touch screen panel according to embodiments of the present invention may be installed in a display screen of an image display device such as a liquid crystal display (LCD), a cathode ray type (CRT), a plasma display panel (PDP), an electroluminescence (EL), and the like. While viewing the display screen of the image display device, a user may contact a predetermined location of the touch screen panel
15 according to information that the user desires to view.

The touch screen panel according to embodiments of the present invention may provide a panel that constitutes a touch region in a polygonal shape or a circular shape consisting of at least three lines. The touch screen panel may recognize a position contacted by the user (hereinafter, referred to as a "contact location") using a new
20 positioning scheme.

Hereinafter, a positioning method of a touch screen panel according to an embodiment of the present invention will be described in detail.

FIG. 2 is a flowchart illustrating a positioning method of a touch screen panel according to an embodiment of the present invention.

25 In operation S201, the touch screen panel may define a central point and a reference line in a touch region for positioning of a contact location of a user.

FIG. 3 is a diagram for describing a positioning method in a touch screen panel according to an embodiment of the present invention.

30 The touch screen panel may provide a touch region 301 in a polygonal shape or a circular shape consisting of at least three lines.

Initially, a central point 302 and a reference line 303 may be defined with respect to the touch region 301. The central point 302 may be set as a right central

location of the touch region 301. The reference line 303 may be set as a line that is extended from the central point 302 to the circumference of the touch region 301.

Particularly, a polygonal shape or a circular shape constituting the touch region 301 may be in a 360-degree rotational type based on the central point 302. Therefore,
5 the reference line 303 may have an angle of about zero to about 360 degrees with respect to the central point 302.

In operation S202, the touch screen panel may determine whether an external contact of the user occurs in a predetermined location of the touch region 301.

In operation S203, when the external contact occurs, the touch screen panel
10 may calculate a distance and an angle with respect to a contact location based on the central point and the reference line.

In further descriptions referring to FIG. 3, the touch screen panel may calculate a distance R 305 between the central point 302 and a contact location 304 with respect to the contact location 304 of the user. The touch screen panel may calculate an angle
15 θ 306 between the reference line 303 and a line that is extended from the contact location 304 to the central point 302.

The touch screen panel may recognize the calculated distance 305 and the angle 306, as a positioning value of the contact location 304. Specifically, the positioning value of the contact location 304 may be expressed and recognized in a form of
20 (distance, angle) according to the distance 305 and the angle 306 that are calculated based on the central point 302 and the reference line 303.

In operation S204, the touch screen panel may output, as an input signal, information that is predetermined according to the positioning value (distance, angle) of the contact location.

25 According to an aspect of the present invention, a touch screen panel may pre-define information corresponding to an input signal target for each positioning value in a touch region. Specifically, when a user contacts a predetermined location of the touch region, the touch screen panel may recognize a positioning value corresponding to the contact location and then output, as an input signal, information that is
30 predetermined with respect to the recognized positioning value.

According to the above positioning method, when a location or a shape of a touch screen panel or an image display device for installing the touch screen panel is

changed, it is possible to re-set a central point and a reference line of the touch screen panel to a desired location and thereby readily perform correction. Specifically, although information that is predetermined according to a positioning value is not changed, it is possible to perform correction according to the change in a location or
5 shape of the touch screen panel or the image display device by resetting the central point and the reference line.

Hereinafter, a positioning apparatus for performing a positioning method of a touch screen panel according to an embodiment of the present invention will be described. FIG. 4 is a diagram illustrating a configuration of a positioning apparatus
10 of a touch screen panel according to an embodiment of the present invention.

As shown in FIG. 4, the touch screen panel provides the positioning apparatus that includes a panel unit 401, a positioning value calculator 403, and an information output unit 405.

The panel unit 401 may provide a touch region for a user to input information.
15 The touch region may be manufactured in various types of shapes such as a polygon, a circle, and the like that includes at least three lines.

When an external contact occurs in the touch region of the panel unit 401, the positioning value calculator 403 may recognize a positioning value of the contact location.

20 Specifically, the positioning value calculator 403 may pre-set a central point of the touch region and a reference line that is extended from the central point to the circumference of the touch region for positioning of the contact location.

The positioning value calculator 403 may calculate a distance between the contact location and the central point based on the set central point. The positioning
25 value calculator 403 may calculate an angle between the reference line and a line that is extended from the contact location to the central point.

The positioning value calculator 403 may recognize the calculated distance and the angle as the positioning value of the contact location. Specifically, the positioning value of the contact location may be expressed in a form of (distance, angle).

30 The information output unit 405 may receive the calculated positioning value of the contact location and output, as an input signal, information that is predetermined according to the received positioning value.

As described above, according to an embodiment of the present invention, the touch screen panel may perform positioning of a contact location using a distance with a central point and an angle with a reference line. Through this, it is possible to overcome a design limit of a panel unit providing a touch region and a problem caused
5 by the design limit.

The exemplary embodiments of the present invention include computer-readable media including program instructions to implement various operations embodied by a computer. The media may also include, alone or in combination with the program instructions, data files, data structures, tables, and the like. The media and program
10 instructions may be those specially designed and constructed for the purposes of the present invention, or they may be of the kind well known and available to those having skill in the computer software arts. Examples of computer-readable media include magnetic media such as hard disks, floppy disks, and magnetic tape; optical media such as CD ROM disks; magneto-optical media such as floptical disks; and hardware devices
15 that are specially configured to store and perform program instructions, such as read-only memory devices (ROM) and random access memory (RAM). Examples of program instructions include both machine code, such as produced by a compiler, and files containing higher level code that may be executed by the computer using an interpreter.

20 Although a few embodiments of the present invention have been shown and described, the present invention is not limited to the described embodiments. Instead, it would be appreciated by those skilled in the art that changes may be made to these embodiments without departing from the principles and spirit of the invention, the scope of which is defined by the claims and their equivalents.

CLAIMS

1. A positioning method of a touch screen panel, the method comprising:
calculating a distance and an angle with respect to a contact location when an external contact occurs in a touch region of a predetermined shape; and
5 recognizing the calculated distance and the angle as a positioning value of the contact location.
2. The method of claim 1, wherein the touch region is formed in a polygonal shape or a circular shape that includes at least three lines.
10
3. The method of claim 1, further comprising:
pre-setting a central point of the touch region and a reference line that is extended from the central point to the circumference of the touch region.
- 15 4. The method of claim 3, wherein the calculating comprises:
calculating a distance between the contact location and the central point based on the reference line; and
calculating an angle between the reference line and a line that is extended from the contact location to the central point, based on the reference line.
20
5. The method of claim 1, further comprising:
outputting, as an input signal, information that is predetermined according to the positioning value.
- 25 6. The method of claim 3, further comprising:
re-setting the central point and the reference line when a location or a shape of the touch region is changed.
7. A computer-readable recording medium storing a program for implementing the
30 method according to any one of claims 1 through 6.
8. A positioning apparatus of a touch screen panel, the apparatus comprising:

a panel unit to include a touch region of a predetermined shape; and
a positioning value calculator to calculate a distance and an angle with respect
to a contact location when an external contact occurs in the touch region, and to
recognize the calculated distance and the angle as a positioning value of the contact
5 location.

9. The apparatus of claim 8, wherein the touch region of the panel unit is formed
in a polygonal shape or a circular shape that includes at least three lines.

10 10. The apparatus of claim 8, wherein the positioning value calculator pre-sets a
central point of the touch region and a reference line that is extended from the central
point to the circumference of the touch region.

11. The apparatus of claim 10, wherein the positioning value calculator calculates a
15 distance between the contact location and the central point based on the reference line,
and calculates an angle between the reference line and a line that is extended from the
contact location to the central point, based on the reference line.

12. The apparatus of claim 8, further comprising:
20 an information output unit to output, as an input signal, information that is
predetermined according to the positioning value.

FIG. 1

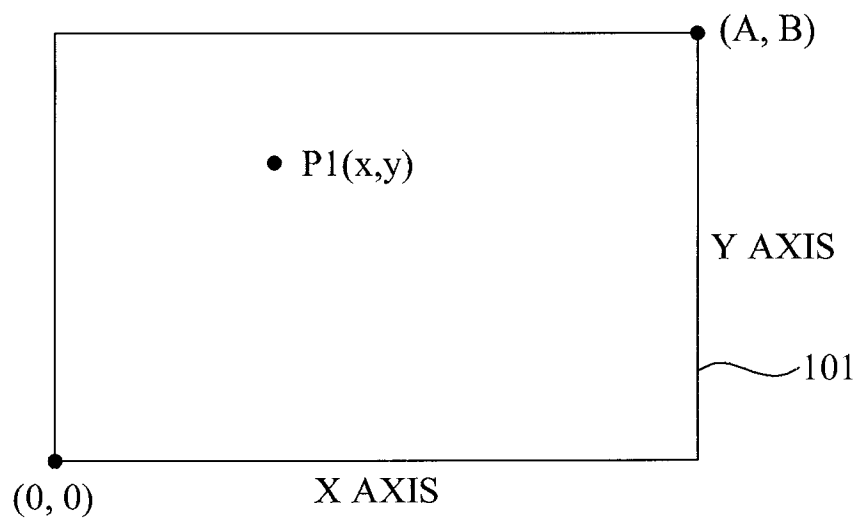


FIG. 2

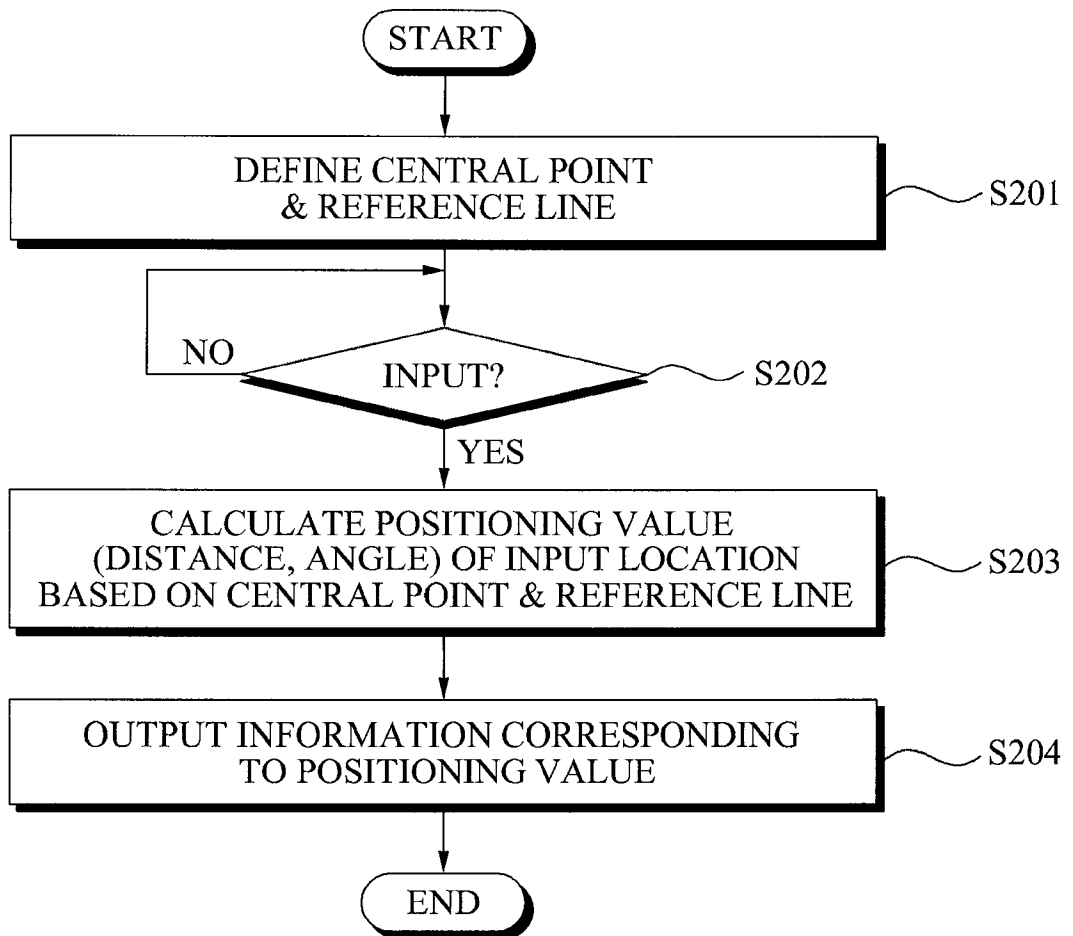


FIG. 3

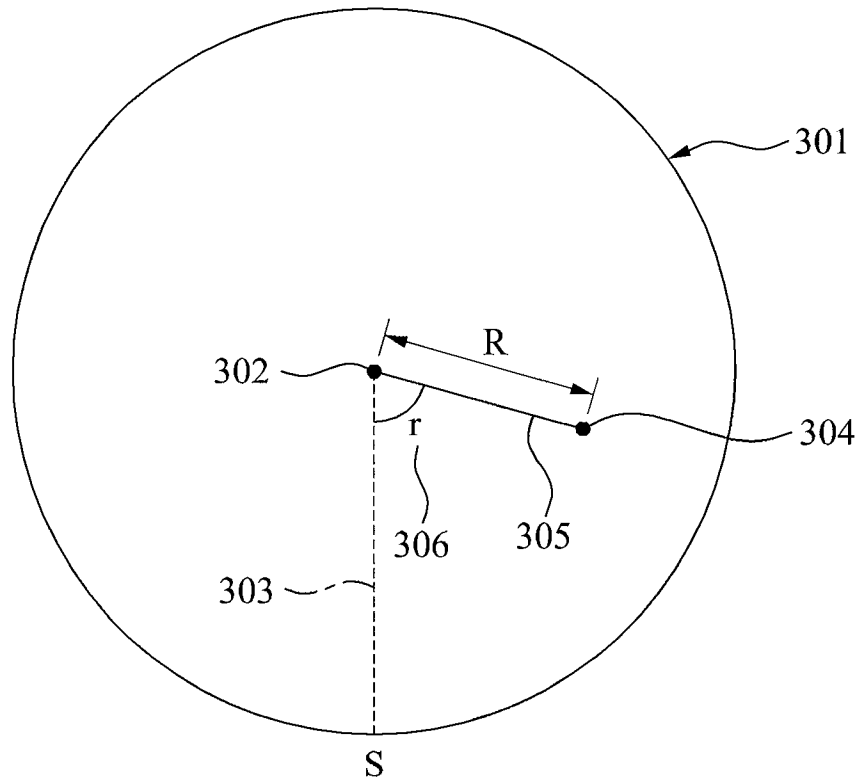
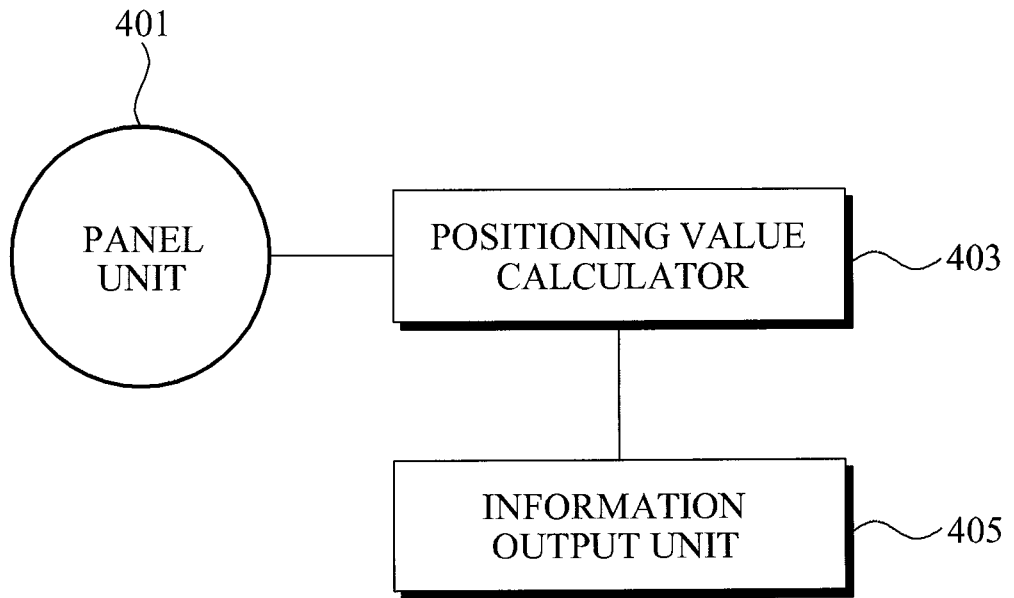


FIG. 4



A. CLASSIFICATION OF SUBJECT MATTER*G06F 3/041(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)

IPC : G06F G06M

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

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

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

eKIPASS(KIPO Internal) "TOUCH", "POSITIONING"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/0026535 A1 (HOTELLING et al.) 2 February 2006 See abstract, claims 1,47-48, paragraphs [0085]-[0086] and FIGS.3A-3B	1-12
A	WO 2005/114369 A2 (APPLE COMPUTER, INC.) 1 December 2005 See abstract, claims 34-35 and FIGS.1,17E	1-12
A	US 2003/0160155 A1 (LIESS) 28 August 2003 See abstract, claim 1, paragraphs [0022] and FIG.1	1-12

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2008/003780

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