| | |
|---|---|
| United States Patent | 12395717 |
| Kind Code | B2 |
| Date of Patent | August 19, 2025 |
| Inventor(s) | Kim; Jongjun et al. |


# Camera module and electronic device including the same


## Abstract

According to various embodiments of the disclosure, a camera module and/or an electronic device including same may include: a sensor substrate, an image sensor disposed on one surface of the sensor substrate, a sensor enclosure disposed on the sensor substrate surrounding at least a part of the image sensor, and an optical element comprising a filter disposed in the sensor enclosure facing the image sensor, wherein the image sensor may be configured to detect light incident through the optical element, and the sensor enclosure may be attached to an edge of one surface of the image sensor, at least partially facing the optical element.



**Inventors:** **Kim; Jongjun (Suwon-si, KR), Jo; Kiyun (Suwon-si, KR)**

**Applicant:** **Samsung Electronics Co., Ltd.** (Suwon-si, KR)



**Family ID:** **1000008762205**

**Assignee:** **Samsung Electronics Co., Ltd. (Suwon-si, KR)**

**Appl. No.:** **17/959758**

**Filed:** **October 04, 2022**

## Prior Publication Data

| Document Identifier | Publication Date |
|---|---|
| US 20230164413 A1 | May. 25, 2023 |

## Foreign Application Priority Data

| | | |
|---|---|---|
| KR | 10-2021-0164917 | Nov. 25, 2021 |
| KR | 10-2022-0008968 | Jan. 21, 2022 |

## Related U.S. Application Data

continuation parent-doc WO PCT/KR2022/013790 20220915 PENDING child-doc US 17959758

## Publication Classification

**Int. Cl.:** **H04N23/55** (20230101); **H04M1/02** (20060101); **H04N23/51** (20230101); **H04N23/54** (20230101)

**U.S. Cl.:**

CPC **H04N23/55** (20230101); **H04M1/0264** (20130101); **H04N23/51** (20230101); **H04N23/54** (20230101);

## Field of Classification Search

**CPC:** H04N (23/55); H04N (23/51); H04N (23/54); H04M (1/0264)

**USPC:** 348/374

## References Cited


**U.S. PATENT DOCUMENTS**

| Patent No. | Issued Date | Patentee Name | U.S. Cl. | CPC |
|---|---|---|---|---|
| 2006/0227236 | 12/2005 | Pak | N/A | N/A |
| 2007/0117423 | 12/2006 | Kim et al. | N/A | N/A |
| 2013/0021485 | 12/2012 | Hsu | 348/208.99 | G02B 27/64 |
| 2017/0003357 | 12/2016 | Tondra et al. | N/A | N/A |
| 2017/0272636 | 12/2016 | Wang et al. | N/A | N/A |
| 2018/0205857 | 12/2017 | Chan et al. | N/A | N/A |
| 2019/0148429 | 12/2018 | Wang et al. | N/A | N/A |
| 2019/0258141 | 12/2018 | Park | N/A | H04N 23/45 |
| 2020/0004012 | 12/2019 | Li et al. | N/A | N/A |
| 2021/0074750 | 12/2020 | Gu et al. | N/A | N/A |
| 2021/0281722 | 12/2020 | Jeong et al. | N/A | N/A |
| 2021/0314468 | 12/2020 | Liang | N/A | H04N 23/52 |

**FOREIGN PATENT DOCUMENTS**

| Patent No. | Application Date | Country | CPC |
|---|---|---|---|
| 2005-159187 | 12/2004 | JP | N/A |
| 2006-086913 | 12/2005 | JP | N/A |
| 2015-529851 | 12/2014 | JP | N/A |
| 2017-512353 | 12/2016 | JP | N/A |
| 10-2006-0107257 | 12/2005 | KR | N/A |
| 10-0675215 | 12/2006 | KR | N/A |
| 10-2007-0054304 | 12/2006 | KR | N/A |
| 10-2010-0013908 | 12/2009 | KR | N/A |

| | | | |
|---|---|---|---|
| 10-2010-0083924 | 12/2009 | KR | N/A |
| 10-1022865 | 12/2010 | KR | N/A |
| 10-2016-0009358 | 12/2015 | KR | N/A |
| 10-2017-0117686 | 12/2016 | KR | N/A |
| 10-2018-0092251 | 12/2017 | KR | N/A |
| 10-2018-0092726 | 12/2017 | KR | N/A |
| 10-2019-0129799 | 12/2018 | KR | N/A |
| 10-2020-0110972 | 12/2019 | KR | N/A |
| 10-2021-0031068 | 12/2020 | KR | N/A |

**OTHER PUBLICATIONS**

Search Report and Written Opinion dated Dec. 29, 2022 issued in International Patent Application No. PCT/KR2022/013790. cited by applicant
Extended Search Report dated Oct. 24, 2024 in European Patent Application No. 22898796.2. cited by applicant

*Primary Examiner:* Fosselman; Joel W

*Attorney, Agent or Firm:* Nixon & Vanderhye, P.C.

## Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) This application is a continuation of International Application No. PCT/KR2022/013790 designating the United States, filed on Sep. 15, 2022, in the Korean Intellectual Property Receiving Office and claiming priority to Korean Patent Application No. 10-2021-0164917, filed on Nov. 25, 2021, in the Korean Intellectual Property Office, and to Korean Patent Application No. 10-2022-0008968, filed on Jan. 21, 2022, in the Korean Intellectual Property Office, the disclosures of all of which are incorporated by reference herein in their entireties.

BACKGROUND
Field
(1) The disclosure relates to an electronic device, for example, to a camera module and/or an electronic device including the same.
Description of Related Art
(2) Electronic devices may refer to device configured to perform specific functions according to installed programs, such as home appliances, electronic wallets, portable multimedia players, mobile communication terminals, tablet PCs, video/audio devices, desktop/laptop computers, and vehicle navigation systems. For example, electronic devices may output stored information as sounds or images. In line with the high degree of integration of electronic devices and the widespread use of super-fast large-capacity wireless communication, it has recently become possible to equip a single electronic device (for example, mobile communication terminal) with various functions. For example, not only a communication function, but also an entertainment function (for example, gaming), a multimedia function (for example, music/video playback), communication and security functions for mobile banking and the like, a scheduling function, and an electronic wallet function may be integrated into a single electronic device.
(3) Development of digital camera manufacturing technologies has commercialized electronic devices equipped with small and lightweight camera modules. Electronic devices (for example, mobile communication terminals) commonly carried all the time are equipped with camera

modules such that users can conveniently use various functions including not only still or moving image capture, but also video conferencing and augmented reality.

(4) There has recently been widespread use of electronic devices including multiple cameras. An electronic device may include, for example, a camera module including a wide-angle camera and a telephoto camera. The electronic device may use the wide-angle camera to photograph a wide range of scenes on the periphery of the electronic device, thereby acquiring wide-angle images, or may use the telephoto camera to photograph scenes corresponding to locations relatively far from the electronic device, thereby acquiring telephoto images. As such, compact electronic devices (for example, smartphones) including multiple camera modules or lens assemblies have gradually replaced compact cameras, and are expected to replace high-performance cameras (for example, single-lens reflex cameras) in the future.

(5) The above-described information may be provided as a background art for helping understand the disclosure. No claim or determination is raised regarding whether any of the above description is applicable as a prior art in connection with the disclosure.

(6) In connection with mounting multiple camera modules, it may be difficult to secure a space in which the camera modules can be disposed, in the case of a compact electronic device (for example, smartphone). For example, a limited number of camera modules may be mounted on electronic devices which tend to become compact, lightweight, and/or thin in view of portability, and there may be restrictions on securing spaces or ranges in which lens(es) can move, thereby making it difficult to implement continuous zoom functions.

(7) A folded camera may be useful in expanding the range of adjustment of the focal length. For example, a folded camera may have a reflective member (for example, prism or mirror) disposed such that, regardless of the direction of incident external light, the direction or arrangement of lenses may be freely designed. Such an improvement in the degree of freedom regarding design of the arrangement direction of lenses in a folded camera may implement a compact telephoto camera, which may be combined with a wide-angle camera and mounted in an electronic device.

(8) In a typical manner in which a user holds an electronic device, or according to a typical configuration of an electronic device, external light may enter the electronic device substantially parallel to the thickness direction of the electronic device when photographing a subject. When a folded camera is disposed in such a typical electronic device or typical holding manner, the direction in which external light enters the electronic device may differ from the direction in which light enters an image sensor. For example, the width or length of the image sensor or image-focusing surface may affect the thickness of the electronic device, and there may thus be difficulty in disposing a folded camera in a compact or flat electronic device (for example, smartphone).

## SUMMARY

(9) Embodiments of the disclosure provide a compact camera module and/or an electronic device including the same.

(10) Embodiments of the disclosure may provide a camera module having a folded camera structure such that the same contributes to improvement of telephoto performance, and can be easily mounted in a compact electronic device.

(11) Embodiments of the disclosure may provide an electronic device which is compact, and which includes multiple camera modules, thereby having an improved optical performance.

(12) Additional aspects according to various embodiments will be presented in the following detailed description.

(13) According to various example embodiments of the disclosure, a camera module and/or an electronic device including the same may include: a sensor substrate, an image sensor disposed on one surface of the sensor substrate, a sensor enclosure disposed on the sensor substrate surrounding at least a part of the image sensor, and an optical element comprising a light filter disposed in the sensor enclosure facing the image sensor, wherein the image sensor is configured to detect light incident through the optical element, wherein the sensor enclosure is attached to an edge of one

surface of the image sensor at least partially facing the optical element.
(14) According to various example embodiments of the disclosure, an electronic device may include: a housing including a first surface facing a first direction and a second surface facing a second direction opposite to the first direction, and at least one camera module comprising a camera configured to detect light incident through one of the first surface or the second surface, wherein the at least one camera module includes: a sensor substrate, an image sensor disposed on one surface of the sensor substrate, a sensor enclosure disposed on the sensor substrate surrounding at least a part of the image sensor, an infrared blocking filter disposed in the sensor enclosure facing the image sensor, a reflective member comprising a reflective surface configured to receive external light incident through one of the first surface or the second surface from the direction of a first optical-axis and refract or reflect the external light in the direction of a second optical-axis intersecting with the first optical-axis, and at least one lens disposed between the reflective member and the image sensor along the direction of the second optical-axis and configured to guide or focus light refracted or reflected by the reflective member to the image sensor, wherein the image sensor is configured to detect light incident through the infrared blocking filter, and at least a part of the sensor enclosure is attached to an edge of one surface of the image sensor, which faces the infrared blocking filter.
(15) A camera module and/or an electronic device according to various example embodiments of the disclosure may use a sensor enclosure to protect an image sensor from external environments, and the same may be at least partially attached to the surface of the image sensor, thereby facilitating compactness. For example, a camera module according to various example embodiments of the disclosure may be easily disposed in a compact or flat electronic device, and may be useful for a structure in which an electronic device includes multiple camera modules. In an example embodiment, when a camera module according to various example embodiments of the disclosure has a folded structure including a reflective member, the same may be easily disposed in a compact or flat electronic device so as to improve the telephoto performance of the electronic device. Various other advantageous effects identified explicitly or implicitly through the disclosure may be provided.

---

## Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) The above and other aspects, features, and/or advantages of certain embodiments of the present disclosure will be more apparent m from the following detailed description, taken in conjunction with the accompanying drawings, in which:
(2) FIG. **1** is a block diagram illustrating an example electronic device in a network environment according to various embodiments;
(3) FIG. **2** is a front perspective view of an electronic device according to various embodiments;
(4) FIG. **3** is a rear perspective view of the electronic device illustrated in FIG. **2** according to various embodiments;
(5) FIG. **4** is an exploded perspective view of the electronic device illustrated in FIG. **2** according to various embodiments;
(6) FIG. **5** is a diagram illustrating the rear surface of an electronic device according to various embodiments;
(7) FIG. **6** is a partial cross-sectional view of an electronic device taken along the A-A′ of FIG. **5** according to various embodiments;
(8) FIG. **7** is a perspective view of a camera module according to various embodiments;
(9) FIG. **8** is a perspective view of a sensor assembly of a camera module according to various embodiments;

(10) FIG. **9** is an exploded perspective view of a sensor assembly of a camera module according to various embodiments;
(11) FIG. **10** is a diagram illustrating an image sensor of a camera module according to various embodiments;
(12) FIG. **11** is a sectional structural view of a sensor assembly of a camera module, taken along line B-B′ of FIG. **8** according to various embodiments;
(13) FIG. **12** is a cross-sectional perspective view of a sensor assembly of a camera module, taken along line B-B′ of FIG. **8** according to various embodiments;
(14) FIG. **13** is a sectional view of a sensor assembly of a camera module, taken along line B-B′ of FIG. **8** according to various embodiments;
(15) FIG. **14** is a cross-sectional perspective view of a sensor assembly of a camera module, taken along line B-B′ of FIG. **8** according to various embodiments; and
(16) FIG. **15** is a sectional view of a sensor assembly of a camera module, taken along line C-C′ of FIG. **8** according to various embodiments.
(17) Throughout the accompanying drawings, similar reference numbers may be assigned to similar components, configurations, and/or structures.

DETAILED DESCRIPTION

(18) The following description with reference to the accompanying drawings may be provided to assist in a comprehensive understanding for variously implementing the disclosure. The various example embodiments disclosed in the following descriptions include various specific details for helping understanding, but may be regarded as one of various embodiments. Accordingly, it will be apparent to a person skilled in the art that various changes and modifications of the various implementations disclosed in the disclosure may be made without departing from the technical idea and scope of the disclosure. In addition, descriptions of well-known functions and configurations may be omitted for clarity and conciseness.
(19) The terms and words used in the following descriptions and claims may not be limited to the bibliographical meanings, and may be used to clearly and consistently describe the various embodiments of the disclosure. Accordingly, it should be apparent to a person skilled in the art that the following descriptions for various implements of the disclosure are provided for an explanation purpose only and not for the purpose of limitation.
(20) It should be understood that the singular forms “a”, “an”, and “the” include plural referents unless the context clearly dictates otherwise. Therefore, for example, it may refer, for example, to the term “the surface of an element” including one or more of the surfaces of the element.
(21) FIG. **1** is a block diagram illustrating an example electronic device **101** in a network environment **100** according to various embodiments.
(22) Referring to FIG. **1**, the electronic device **101** in the network environment **100** may communicate with an electronic device **102** via a first network **198** (e.g., a short-range wireless communication network), or at least one of an electronic device **104** or a server **108** via a second network **199** (e.g., a long-range wireless communication network). According to an embodiment, the electronic device **101** may communicate with the electronic device **104** via the server **108**. According to an embodiment, the electronic device **101** may include a processor **120**, memory **130**, an input module **150**, a sound output module **155**, a display module **160**, an audio module **170**, a sensor module **176**, an interface **177**, a connecting terminal **178**, a haptic module **179**, a camera module **180**, a power management module **188**, a battery **189**, a communication module **190**, a subscriber identification module (SIM) **196**, or an antenna module **197**. In various embodiments, at least one of the components (e.g., the connecting terminal **178**) may be omitted from the electronic device **101**, or one 1 or more other components may be added in the electronic device **101**. In various embodiments, some of the components (e.g., the sensor module **176**, the camera module **180**, or the antenna module **197**) may be implemented as a single component (e.g., the display module **160**).

(23) The processor **120** may execute, for example, software (e.g., a program **140**) to control at least one other component (e.g., a hardware or software component) of the electronic device **101** coupled with the processor **120**, and may perform various data processing or computation. According to an embodiment, as at least part of the data processing or computation, the processor **120** may store a command or data received from another component (e.g., the sensor module **176** or the communication module **190**) in volatile memory **132**, process the command or the data stored in the volatile memory **132**, and store resulting data in non-volatile memory **134**. According to an embodiment, the processor **120** may include a main processor **121** (e.g., a central processing unit (CPU) or an application processor (AP)), or an auxiliary processor **123** (e.g., a graphics processing unit (GPU), a neural processing unit (NPU), an image signal processor (ISP), a sensor hub processor, or a communication processor (CP)) that is operable independently from, or in conjunction with, the main processor **121**. For example, when the electronic device **101** includes the main processor **121** and the auxiliary processor **123**, the auxiliary processor **123** may be adapted to consume less power than the main processor **121**, or to be specific to a specified function. The auxiliary processor **123** may be implemented as separate from, or as part of the main processor **121**.

(24) The auxiliary processor **123** may control, for example, at least some of functions or states related to at least one component (e.g., the display module **160**, the sensor module **176**, or the communication module **190**) among the components of the electronic device **101**, instead of the main processor **121** while the main processor **121** is in an inactive (e.g., sleep) state, or together with the main processor **121** while the main processor **121** is in an active (e.g., executing an application) state. According to an embodiment, the auxiliary processor **123** (e.g., an image signal processor or a communication processor) may be implemented as part of another component (e.g., the camera module **180** or the communication module **190**) functionally related to the auxiliary processor **123**. According to an embodiment, the auxiliary processor **123** (e.g., the neural processing unit) may include a hardware structure specified for artificial intelligence model processing. An artificial intelligence model may be generated by machine learning. Such learning may be performed, e.g., by the electronic device **101** where the artificial intelligence model is performed or via a separate server (e.g., the server **108**). Learning algorithms may include, but are not limited to, e.g., supervised learning, unsupervised learning, semi-supervised learning, or reinforcement learning. The artificial intelligence model may include a plurality of artificial neural network layers. The artificial neural network may be a deep neural network (DNN), a convolutional neural network (CNN), a recurrent neural network (RNN), a restricted Boltzmann machine (RBM), a deep belief network (DBN), a bidirectional recurrent deep neural network (BRDNN), deep Q-network or a combination of two or more thereof but is not limited thereto. The artificial intelligence model may, additionally or alternatively, include a software structure other than the hardware structure.

(25) The memory **130** may store various data used by at least one component (e.g., the processor **120** or the sensor module **176**) of the electronic device **101**. The various data may include, for example, software (e.g., the program **140**) and input data or output data for a command related thereto. The memory **130** may include the volatile memory **132** or the non-volatile memory **134**.

(26) The program **140** may be stored in the memory **130** as software, and may include, for example, an operating system (OS) **142**, middleware **144**, or an application **146**.

(27) The input module **150** may receive a command or data to be used by another component (e.g., the processor **120**) of the electronic device **101**, from the outside (e.g., a user) of the electronic device **101**. The input module **150** may include, for example, a microphone, a mouse, a keyboard, a key (e.g., a button), or a digital pen (e.g., a stylus pen).

(28) The sound output module **155** may output sound signals to the outside of the electronic device **101**. The sound output module **155** may include, for example, a speaker or a receiver. The speaker may be used for general purposes, such as playing multimedia or playing record. The receiver may

be used for receiving incoming calls. According to an embodiment, the receiver may be implemented as separate from, or as part of the speaker.
(29) The display module **160** may visually provide information to the outside (e.g., a user) of the electronic device **101**. The display module **160** may include, for example, a display, a hologram device, or a projector and control circuitry to control a corresponding one of the display, hologram device, and projector. According to an embodiment, the display module **160** may include a touch sensor adapted to detect a touch, or a pressure sensor adapted to measure the intensity of force incurred by the touch.
(30) The audio module **170** may convert a sound into an electrical signal and vice versa. According to an embodiment, the audio module **170** may obtain the sound via the input module **150**, or output the sound via the sound output module **155** or an external electronic device (e.g., an electronic device **102** (e.g., a speaker or a headphone)) directly or wirelessly coupled with the electronic device **101**.
(31) The sensor module **176** may detect an operational state (e.g., power or temperature) of the electronic device **101** or an environmental state (e.g., a state of a user) external to the electronic device **101**, and then generate an electrical signal or data value corresponding to the detected state. According to an embodiment, the sensor module **176** may include, for example, a gesture sensor, a gyro sensor, an atmospheric pressure sensor, a magnetic sensor, an acceleration sensor, a grip sensor, a proximity sensor, a color sensor, an infrared (IR) sensor, a biometric sensor, a temperature sensor, a humidity sensor, or an illuminance sensor.
(32) The interface **177** may support one or more specified protocols to be used for the electronic device **101** to be coupled with the external electronic device (e.g., the electronic device **102**) directly or wirelessly. According to an embodiment, the interface **177** may include, for example, a high definition multimedia interface (HDMI), a universal serial bus (USB) interface, a secure digital (SD) card interface, or an audio interface.
(33) A connecting terminal **178** may include a connector via which the electronic device **101** may be physically connected with the external electronic device (e.g., the electronic device **102**). According to an embodiment, the connecting terminal **178** may include, for example, an HDMI connector, a USB connector, an SD card connector, or an audio connector (e.g., a headphone connector).
(34) The haptic module **179** may convert an electrical signal into a mechanical stimulus (e.g., a vibration or a movement) or electrical stimulus which may be recognized by a user via his tactile sensation or kinesthetic sensation. According to an embodiment, the haptic module **179** may include, for example, a motor, a piezoelectric element, or an electric stimulator.
(35) The camera module **180** may capture a still image or moving images. According to an embodiment, the camera module **180** may include one or more lenses, image sensors, image signal processors, or flashes.
(36) The power management module **188** may manage power supplied to the electronic device **101**. According to an embodiment, the power management module **188** may be implemented as at least part of, for example, a power management integrated circuit (PMIC).
(37) The battery **189** may supply power to at least one component of the electronic device **101**. According to an embodiment, the battery **189** may include, for example, a primary cell which is not rechargeable, a secondary cell which is rechargeable, or a fuel cell.
(38) The communication module **190** may support establishing a direct (e.g., wired) communication channel or a wireless communication channel between the electronic device **101** and the external electronic device (e.g., the electronic device **102**, the electronic device **104**, or the server **108**) and performing communication via the established communication channel. The communication module **190** may include one or more communication processors that are operable independently from the processor **120** (e.g., the application processor (AP)) and supports a direct (e.g., wired) communication or a wireless communication. According to an embodiment, the

communication module **190** may include a wireless communication module **192** (e.g., a cellular communication module, a short-range wireless communication module, or a global navigation satellite system (GNSS) communication module) or a wired communication module **194** (e.g., a local area network (LAN) communication module or a power line communication (PLC) module). A corresponding one of these communication modules may communicate with the external electronic device via the first network **198** (e.g., a short-range communication network, such as Bluetooth™, wireless-fidelity (Wi-Fi) direct, or infrared data association (IrDA)) or the second network **199** (e.g., a long-range communication network, such as a legacy cellular network, a 5G network, a next-generation communication network, the Internet, or a computer network (e.g., LAN or wide area network (WAN)). These various types of communication modules may be implemented as a single component (e.g., a single chip), or may be implemented as multi components (e.g., multi chips) separate from each other. The wireless communication module **192** may identify or authenticate the electronic device **101** in a communication network, such as the first network **198** or the second network **199**, using subscriber information (e.g., international mobile subscriber identity (IMSI)) stored in the subscriber identification module **196**.

(39) The wireless communication module **192** may support a 5G network, after a 4G network, and next-generation communication technology, e.g., new radio (NR) access technology. The NR access technology may support enhanced mobile broadband (eMBB), massive machine type communications (mMTC), or ultra-reliable and low-latency communications (URLLC). The wireless communication module **192** may support a high-frequency band (e.g., the mmWave band) to achieve, e.g., a high data transmission rate. The wireless communication module **192** may support various technologies for securing performance on a high-frequency band, such as, e.g., beamforming, massive multiple-input and multiple-output (massive MIMO), full dimensional MIMO (FD-MIMO), array antenna, analog beam-forming, or large scale antenna. The wireless communication module **192** may support various requirements specified in the electronic device **101**, an external electronic device (e.g., the electronic device **104**), or a network system (e.g., the second network **199**). According to an embodiment, the wireless communication module **192** may support a peak data rate (e.g., 20 Gbps or more) for implementing eMBB, loss coverage (e.g., 164 dB or less) for implementing mMTC, or U-plane latency (e.g., 0.5 ms or less for each of downlink (DL) and uplink (UL), or a round trip of 1 ms or less) for implementing URLLC.

(40) The antenna module **197** may transmit or receive a signal or power to or from the outside (e.g., the external electronic device) of the electronic device **101**. According to an embodiment, the antenna module may include an antenna including a radiating element including a conductive material or a conductive pattern formed in or on a substrate (e.g., a printed circuit board (PCB)). According to an embodiment, the antenna module **197** may include a plurality of antennas (e.g., array antennas). In such a case, at least one antenna appropriate for a communication scheme used in the communication network, such as the first network **198** or the second network **199**, may be selected, for example, by the communication module **190** from the plurality of antennas. The signal or the power may then be transmitted or received between the communication module **190** and the external electronic device via the selected at least one antenna. According to an embodiment, another component (e.g., a radio frequency integrated circuit (RFIC)) other than the radiating element may be additionally formed as part of the antenna module **197**.

(41) According to various embodiments, the antenna module **197** may form a mmWave antenna module. According to an embodiment, the mmWave antenna module may include a printed circuit board, an RFIC disposed on a first surface (e.g., the bottom surface) of the printed circuit board, or adjacent to the first surface and capable of supporting a designated high-frequency band (e.g., the mmWave band), and a plurality of antennas (e.g., array antennas) disposed on a second surface (e.g., the top or a side surface) of the printed circuit board, or adjacent to the second surface and capable of transmitting or receiving signals of the designated high-frequency band.

(42) At least some of the above-described components may be coupled mutually and communicate

signals (e.g., commands or data) therebetween via an inter-peripheral communication scheme (e.g., a bus, general purpose input and output (GPIO), serial peripheral interface (SPI), or mobile industry processor interface (MIPI)).

(43) According to an embodiment, commands or data may be transmitted or received between the electronic device **101** and the external electronic device **104** via the server **108** coupled with the second network **199**. Each of the external electronic devices **102** or **104** may be a device of a same type as, or a different type, from the electronic device **101**. According to an embodiment, all or some of operations to be executed at the electronic device **101** may be executed at one or more electronic devices of the external electronic devices **102**, **104**, or **108**. For example, if the electronic device **101** should perform a function or a service automatically, or in response to a request from a user or another device, the electronic device **101**, instead of, or in addition to, executing the function or the service, may request the one or more external electronic devices to perform at least part of the function or the service. The one or more external electronic devices receiving the request may perform the at least part of the function or the service requested, or an additional function or an additional service related to the request, and transfer an outcome of the performing to the electronic device **101**. The electronic device **101** may provide the outcome, with or without further processing of the outcome, as at least part of a reply to the request. To that end, a cloud computing, distributed computing, mobile edge computing (MEC), or client-server computing technology may be used, for example. The electronic device **101** may provide ultra low-latency services using, e.g., distributed computing or mobile edge computing. In an embodiment, the external electronic device **104** may include an internet-of-things (IoT) device. The server **108** may be an intelligent server using machine learning and/or a neural network. According to an embodiment, the external electronic device **104** or the server **108** may be included in the second network **199**. The electronic device **101** may be applied to intelligent services (e.g., smart home, smart city, smart car, or healthcare) based on 5G communication technology or IoT-related technology.

(44) The electronic device according to various embodiments may be one of various types of electronic devices. The electronic devices may include, for example, a portable communication device (e.g., a smartphone), a computer device, a portable multimedia device, a portable medical device, a camera, a wearable device, a home appliance, or the like. According to an embodiment of the disclosure, the electronic devices are not limited to those described above.

(45) It should be appreciated that various embodiments of the disclosure and the terms used therein are not intended to limit the technological features set forth herein to particular embodiments and include various changes, equivalents, or replacements for a corresponding embodiment. With regard to the description of the drawings, similar reference numerals may be used to refer to similar or related elements. It is to be understood that a singular form of a noun corresponding to an item may include one or more of the things, unless the relevant context clearly indicates otherwise. As used herein, each of such phrases as “A or B”, “at least one of A and B”, “at least one of A or B”, “A, B, or C”, “at least one of A, B, and C”, and “at least one of A, B, or C”, may include any one of, or all possible combinations of the items enumerated together in a corresponding one of the phrases. As used herein, such terms as “1st” and “2nd”, or “first” and “second” may be used to simply distinguish a corresponding component from another, and does not limit the components in other aspect (e.g., importance or order). It is to be understood that if an element (e.g., a first element) is referred to, with or without the term “operatively” or “communicatively”, as “coupled with”, “coupled to”, “connected with”, or “connected to” another element (e.g., a second element), the element may be coupled with the other element directly (e.g., wiredly), wirelessly, or via a third element.

(46) As used in connection with various embodiments of the disclosure, the term “module” may include a unit implemented in hardware, software, or firmware, or any combination thereof, and may interchangeably be used with other terms, for example, “logic”, “logic block”, “part”, or

“circuitry”. A module may be a single integral component, or a minimum unit or part thereof, adapted to perform one or more functions. For example, according to an embodiment, the module may be implemented in a form of an application-specific integrated circuit (ASIC).

(47) Various embodiments as set forth herein may be implemented as software (e.g., the program) including one or more instructions that are stored in a storage medium (e.g., internal memory or external memory) that is readable by a machine (e.g., the electronic device). For example, a processor (e.g., the processor) of the machine (e.g., the electronic device) may invoke at least one of the one or more instructions stored in the storage medium, and execute it. This allows the machine to be operated to perform at least one function according to the at least one instruction invoked. The one or more instructions may include a code generated by a complier or a code executable by an interpreter. The machine-readable storage medium may be provided in the form of a non-transitory storage medium. Wherein, the “non-transitory” storage medium is a tangible device, and may not include a signal (e.g., an electromagnetic wave), but this term does not differentiate between where data is semi-permanently stored in the storage medium and where the data is temporarily stored in the storage medium.

(48) According to an embodiment, a method according to various embodiments of the disclosure may be included and provided in a computer program product. The computer program product may be traded as a product between a seller and a buyer. The computer program product may be distributed in the form of a machine-readable storage medium (e.g., compact disc read only memory (CD-ROM)), or be distributed (e.g., downloaded or uploaded) online via an application store (e.g., PlayStore™), or between two user devices (e.g., smart phones) directly. If distributed online, at least part of the computer program product may be temporarily generated or at least temporarily stored in the machine-readable storage medium, such as memory of the manufacturer's server, a server of the application store, or a relay server.

(49) According to various embodiments, each component (e.g., a module or a program) of the above-described components may include a single entity or multiple entities, and some of the multiple entities may be separately disposed in different components. According to various embodiments, one or more of the above-described components or operations may be omitted, or one or more other components or operations may be added. Alternatively or additionally, a plurality of components (e.g., modules or programs) may be integrated into a single component. In such a case, the integrated component may still perform one or more functions of each of the plurality of components in the same or similar manner as they are performed by a corresponding one of the plurality of components before the integration. According to various embodiments, operations performed by the module, the program, or another component may be carried out sequentially, in parallel, repeatedly, or heuristically, or one or more of the operations may be executed in a different order or omitted, or one or more other operations may be added.

(50) In the following detailed descriptions, a longitudinal direction, a width direction, and/or a thickness direction of an electronic device may be mentioned, the longitudinal direction may be defined as the “Y-axis direction”, the width direction may be defined as the “X-axis direction”, and/or the thickness direction may be defined as the “Z-axis direction”. In various embodiments, in connection with the direction in which an element is oriented, in addition to the orthogonal coordinate system illustrated in the drawings, “negative/positive (−/+)” may be mentioned together therewith. For example, the front surface of an electronic device or a housing may be defined as “a surface facing the +Z direction”, and the rear surface thereof may be defined as “a surface facing the −Z direction”. In various embodiments, a side surface of an electronic device or a housing may include a region facing the +X direction, a region facing the +Y direction, a region facing the −X direction, and/or a region facing the −Y direction. In an embodiment, “the X-axis direction” may have a meaning including both “the −X direction” and “the +X direction”. The foregoing is based on the orthogonal coordinate system illustrated in the drawings for the sake of brevity of descriptions, and it should be noted that the directions or descriptions of elements do not limit the

various embodiments disclosed in the disclosure.
(51) FIG. **2** is a front perspective view of an electronic **200** according to various embodiments. FIG. **3** is a rear perspective view of the electronic **200** illustrated in FIG. **2** according to various embodiments.
(52) Referring to FIG. **2** and FIG. **3**, an electronic device **200** according to an embodiment may include a first surface (or a front surface) **210**A, a second surface (or a rear surface) **210**B, and a housing **210** including a side surface **210**C configured to surround a space between the first surface **210**A and the second surface **210**B. In an embodiment (not shown), a housing may be referred to as a structure configured to form a part of the first surface **210**A, the second surface **210**B, and the side surface **210**C of FIG. **2**. According to an embodiment, the first surface **210**A may be formed by a front plate **202** (e.g., a glass plate including various coating layers or a polymer plate) of which at least a portion is substantially transparent. The second surface **210**B may be formed by a substantially opaque rear plate **211**. For example, the rear plate **211** may be formed of coated or colored glass, ceramic, polymer, metal (e.g., aluminum, stainless steel (STS), or magnesium), or a combination of at least two of the above materials. The side surface **210**C may be coupled to the front plate **202** and the rear plate **211**, and may be formed by a side-surface structure (or "a side-surface bezel structure") **218** including metal and/or polymer. In various embodiments, the rear plate **211** and the side-surface structure **218** may be integrally formed, and may include the same material (e.g., a metal material such as aluminum).
(53) In the illustrated embodiment, the front plate **202** may include two first regions **210**D which are provided in opposite long edge ends of the front plate **202** and configured to be bent from the first surface **210**A toward the rear plate **211** and to extend seamlessly. In the illustrated embodiment (see FIG. **3**), the rear plate **211** may include two second regions **210**E which are provided in opposite long edge ends thereof and configured to be bent from the second surface **210**B toward the front plate **202** and to extend seamlessly. In various embodiments, the front plate **202** (or the rear plate **211**) may include only one of the first regions **210**D (or the second regions **210**E). In an embodiment, a part of the first regions **210**D or the second regions **210**E may not be included therein. In the embodiments, when seen from the side surface of the electronic device **200**, the side-surface structure **218** may have a first thickness (or width) in the side-surface side not including the first regions **210**D or the second regions **210**E, and may have a second thickness thinner than the first thickness, in the side-surface side including the first regions **210**D or the second regions **210**E.
(54) According to an embodiment, the electronic device **200** may include at least one of a display **201**, audio modules **203**, **207**, and **214**, sensor modules **204**, **216** and **219**, camera modules **205**, **212**, and **213**, a key input device **217**, a light-emitting element **206**, and connector holes **208** and **209**. In various embodiments, at least one of elements (e.g., the key input device **217** or the light-emitting element **206**) may be omitted from the electronic device **200**, or other elements may be additionally included therein.
(55) For example, the display **201** may be visible through a substantial portion of the front plate **202**. In various embodiments, at least a part of the display **201** may be visible through the front plate **202** configured to form the first surface **210**A and the first regions **210**D of the side surface **210**C. In various embodiments, the corners of the display **201** may be formed to have a shape substantially the same as the outer shape of those of the front plate **202**, which is adjacent thereto. In an embodiment (not shown), in order to expand a region which allows the display **201** to be visually exposed, the gap between the outer perimeter of the display **201** and the outer perimeter of the front plate **202** may be formed to be substantially the same.
(56) In an embodiment (not shown), a recess or an opening may be formed in a part of a screen display region of the display **201**, and at least one of the audio module **214**, the sensor module **204**, the camera module **205**, and the light-emitting element **206**, which are aligned with the recess or the opening, may be included therein. In an embodiment (not shown), at least one of the audio module **214**, the sensor module **204**, the camera module **205**, a fingerprint sensor **216**, and the

light-emitting element **206** may be included on the rear surface of the screen display region of the display **201**. In an embodiment (not shown), the display **201** may be coupled to or disposed adjacent to a touch detection circuit, a pressure sensor capable of measuring the intensity (pressure) of touch, and/or a digitizer for detecting a stylus pen of a magnetic field type. In various embodiments, at least a part of the sensor module **204** or **219** and/or at least a part of a key input device **217** may be positioned in the first regions **210**D and/or the second regions **210**E.

(57) The audio modules **203**, **207**, and **214** may include a microphone hole **203** and speaker holes **207** and **214**. A microphone for acquiring external sound may be disposed inside the microphone hole **203**, and in various embodiments, multiple microphones may be arranged to detect the direction of sound. The speaker holes **207** and **214** may include an external speaker hole **214** and a receiver hole **207** for a call. In various embodiments, the speaker holes **207** and **214** and the microphone hole **203** may be implemented as one hole, or only a speaker may be included without the speaker holes **207** and **214** (e.g., a piezo speaker).

(58) The sensor modules **204**, **216**, and **219** may be configured to generate an electrical signal or a data value corresponding to an internal operation state of the electronic device **200** or an external environmental state. For example, the sensor modules **204**, **216**, and **219** may include a first sensor module **204** (e.g., a proximity sensor) disposed on the first surface **210**A of the housing **210** and/or a second sensor module (not shown) (e.g., a fingerprint sensor), and/or a third sensor module **219** (e.g., an HRM sensor) disposed on the second surface **210**B of the housing **210** and/or a fourth sensor module **216** (e.g., a fingerprint sensor). The fingerprint sensor may be disposed on not only the first surface **210**A (e.g., the display **201**) of the housing **210** but also the second surface **210**B. The electronic device **200** may further include at least one of a sensor module **176** of FIG. **1**, for example, a gesture sensor, a gyro sensor, a barometric pressure sensor, a magnetic sensor, an acceleration sensor, a grip sensor, a color sensor, an infrared (IR) sensor, a biometric sensor, a temperature sensor, a humidity sensor, or an illuminance sensor.

(59) The camera modules **205**, **212**, and **213** may include a first camera device **205** disposed on the first surface **210**A of the electronic device **200**, and a second camera device **212** and/or a flash **213** arranged on the second surface **210**B. The camera devices **205** and **212** each may include one lens or multiple lenses, an image sensor, and/or an image signal processor. For example, the flash **213** may include a light-emitting diode or a xenon lamp. In various embodiments, two or more lenses (an infrared camera, a wide-angle lens, and a telephoto lens) and image sensors may be arranged on one surface of the electronic device **200**.

(60) The key input device **217** may be disposed on the side surface **210**C of the housing **210**. In an embodiment, the electronic device **200** may not include a part or the whole part among key input devices **217** mentioned above, and the key input device **217** not included therein may be implemented as a different type such as a soft key, on the display **201**. In various embodiments, the key input device **217** may include the sensor module **216** disposed on the second surface **210**B of the housing **210**.

(61) For example, the light-emitting element **206** may be disposed on the first surface **210**A of the housing **210**. For example, the light-emitting element **206** may be configured to provide state information of the electronic device **200** in the form of light. In an embodiment, for example, the light-emitting element **206** may provide a light source interlocked with an operation of the camera module **205**. For example, the light-emitting element **206** may include an LED, an IR LED, and a xenon lamp.

(62) The connector holes **208** and **209** may include a first connector hole **208** capable of accommodating a connector (for example, a USB connector) for transmitting and receiving power and/or data to and from an external electronic device, and/or a second connector hole **209** (for example, an earphone jack) capable of accommodating a connector for transmitting and receiving audio signals to and from an external electronic device.

(63) FIG. **4** is an exploded perspective view of the electronic device **200** illustrated in FIG. **2**

according to various embodiments.
(64) Referring to FIG. **4**, an electronic device **300** (e.g., the electronic device **101** or **200** of FIG. **1** to FIG. **3**) may include a side-surface structure **310**, a first support member **311** (e.g., a bracket), a front plate **320** (e.g., the front plate **202** of FIG. **2**), a display **330** (e.g., the display **201** of FIG. **2**), a printed circuit board **340** (e.g., a printed circuit board (PCB), a printed board assembly (PBA), a flexible PCB (FPCB), or rigid-flexible PCB (RFPCB)), a battery **350**, a second support member **360** (e.g., a rear case), an antenna **370**, and a rear plate **380** (e.g., the rear plate **211** of FIG. **3**). In various embodiments, at least one of elements (e.g., the first support member **311** or the second support member **360**) may be omitted from the electronic device **300**, or other elements may be additionally included therein. At least one of elements of the electronic device **300** may be the same as or similar to at least one of elements of the electronic device **200** of FIG. **2** or FIG. **3**, and thus overlapping descriptions will be omitted hereinafter.
(65) The first support member **311** may be disposed inside the electronic device **300** to be connected to the side-surface structure **310** or to be integrally formed with the side-surface structure **310**. For example, the first support member **311** may be formed of a metal material and/or a non-metal (e.g., polymer) material. The support member **311** may have one surface to which the display **330** is coupled, and the other surface to which the printed circuit board **340** is coupled. The printed circuit board **340** may have a processor, a memory, and/or an interface, which are mounted thereon. For example, the processor may include one or more of a central processing unit, an application processor, a graphic processing unit, an image signal processor, a sensor hub processor, or a communication processor.
(66) For example, the memory may include a volatile memory or a non-volatile memory.
(67) For example, the interface may include a high definition multimedia interface (HDMI), a universal serial bus (USB) interface, an SD card interface, and/or an audio interface. For example, the interface may be configured to electrically or physically connect the electronic device **300** to an external electronic device, and may include a USB connector, an SD card/MMC connector, or an audio connector.
(68) The battery **350** may be a device configured to supply power to at least one element of the electronic device **300**, and for example, may include a non-rechargeable primary cell, a rechargeable secondary cell, or a fuel cell. For example, at least a part of the battery **350** may be disposed on substantially the same plane as the printed circuit board **340**. The battery **350** may be integrally disposed inside the electronic device **300**, or may be disposed to be detachable/attachable from/to the electronic device **300**.
(69) The antenna **370** may be disposed between the rear plate **380** and the battery **350**. For example, the antenna **370** may include a near field communication (NFC) antenna, a wireless charging antenna, and/or a magnetic secure transmission (MST) antenna. For example, the antenna **370** may be configured to perform a short-range communication with an external device, or may be configured to transmit/receive a power required for charging in a wireless. In an embodiment, an antenna structure may be formed by a part of the side-surface structure **310** and/or the first support member **311**, or a combination thereof.
(70) In the following detailed descriptions, the electronic device **101**, **102**, **101**, **200**, or **300** of the various embodiments may be referred to, and it should be noted that, with respect to configurations which can be easily understood through the various embodiments, reference numerals in the drawings may be assigned the same or omitted, and detailed descriptions thereof may also be omitted.
(71) FIG. **5** is a diagram illustrating the rear surface of an electronic device **400** (e.g., the electronic device **101**, **102**, **104**, **200**, or **300** of FIG. **1** to FIG. **4**) according to various embodiments disclosed in the disclosure. FIG. **6** is a partial cross-sectional view of the electronic device **400** taken along the A-A′ of FIG. **5** according to various embodiments. FIG. **7** is a perspective view of a camera module **500** (e.g., the camera module **405** of FIG. **6**) according to various embodiments.

(72) Referring to FIG. **5** and FIG. **7**, an electronic device **400** according to various embodiments disclosed in the disclosure may include a camera window **385** disposed on one surface (e.g., the second surface **210**B of FIG. **3**). In various embodiments, the camera window **385** may be a part of the rear plate **380**. In an embodiment, the camera window **385** may be coupled to the rear plate **380** through a decoration member **389**, and when seen from the outside, the decoration member **389** may be exposed in a form of surrounding the perimeter of the camera window **385**. According to an embodiment, the camera window **385** may include multiple transparent regions **387**, and the camera module **500** may be disposed inside the camera window **385** to receive external light through at least one of the transparent regions **387**. In an embodiment, the electronic device **400** may include at least one light source (e.g., an infrared light source) disposed to correspond to the other one of the transparent regions **387** so as to emit light to the outside. For example, the camera modules **405** and **500** or the light source may be arranged to receive external light or emit light to the outside of the electronic device **400**, through one of the transparent regions **387**.
(73) According to various embodiments, the electronic device **400** may include, as the camera modules **405** and **500** or a light-receiving element, at least one of a wide-angle camera, an ultra-wide-angle camera, a close-up camera, a telephoto camera, or an infrared photodiode, and may include a flash (e.g., the flash **213** of FIG. **3**) or an infrared laser diode as a light source or a light-emitting element. In various embodiments, the electronic device **400** may be configured to, using an infrared laser diode and an infrared photodiode, emit an infrared laser toward a subject and receive an infrared laser reflected by the subject, and thus to detect the distance or depth to the subject. In an embodiment, the electronic device **400** may be configured to photograph an image of a subject by one or a combination of two or more of the camera modules, and to provide illumination toward the subject using a flash as necessary.
(74) According to various embodiments, a wide-angle camera, an ultra-wide angle camera, or a close-up camera of the camera modules may be configured to have a smaller length in the direction of the optical axis of a lens(es) when compared to a telephoto camera (e.g., the camera modules **405** and **500**). For example, a telephoto camera (e.g., the camera module **405** and **500**), which has a relatively large focal length adjustment range, may have a lens(es) **453***a*, **453***b*, or **453***c* having a greater forward/backward movement range. In an embodiment, although the lens(es) of a wide-angle camera, an ultra-wide-angle camera, or a close-up camera is disposed along the direction of the thickness (e.g., the thickness measured in the Z-axis direction of FIG. **4** or FIG. **6**) of the electronic device **400**, the influence of the thickness thereof on the thickness of the electronic device **400** may be substantially small. For example, a wide-angle camera, an ultra-wide-angle camera, or a close-up camera may be arranged in the electronic device **400** such that the direction, in which light is incident from the outside to the electronic device **400**, and the direction of the optical-axis of the lens(es) are substantially the same.
(75) According to various embodiments, when compared to a wide-angle camera, an ultra-wide-angle camera, or a close-up camera, the camera modules **405** and **500** (e.g., a telephoto camera) may be configured to have a small field of view, but may be useful for photographing a subject at a greater distance, and may include more the lens(es) **453***a*, **453***b*, and **453***c* or may be configured such that the movement distance of the lens(es) **453***a*, **453***b*, or **453***c* is greater in the adjustment of the focal length thereof. For example, when the lens(es) **453***a*, **453***b*, or **453***c* of the camera module **405** and **500** is disposed in the thickness direction (e.g., the Z-axis direction) of the electronic device **400**, the thickness of the electronic device **400** may be increased, or the camera modules **405** and **500** may be configured to have a substantial portion protruding to the outside of the electronic device **400**.
(76) According to various embodiments, the camera modules **405** and **500** may include a folded camera including an optical member (e.g., the reflective member **455**) such as a prism or mirror, and may be configured to have a free design or arrangement in which the lenses **453***a*, **453***b*, and **453***c* are arranged in the direction (e.g., the direction of the second optical-axis O2 of FIG. **6**),

regardless of the direction (e.g., the direction of the first optical-axis O1 of FIG. **6**) in which external light is incident. For example, a reflective member **455** may be configured to refract or reflect light incident from the outside such that the direction, in which the light travels, is changed and then the light is guided to the lenses **453***a*, **453***b*, and **453***c*. The lenses **453***a*, **453***b*, and **453***c* may be configured to guide or focus, to the image sensor **451**, light refracted or reflected between the reflective member **455** and the image sensor **451** by the reflective member **455** (e.g., reflective surface).

(77) According to various embodiments, the direction of the first optical-axis O1 may be substantially parallel to the thickness direction of the electronic device **400**, and the direction of the second optical-axis O2 may be a direction in which light refracted or reflected by the reflective member **455** travels, and may be a direction intersecting with the direction of the first optical-axis O1. In various embodiments, the direction of the second optical-axis O2 may be substantially perpendicular to the direction of the first optical-axis O1, and may be substantially parallel to the width direction (e.g., the X-axis direction of FIG. **4**) or the longitudinal direction (e.g., the Y-axis direction of FIG. **4**) of the electronic device **400** or a housing (e.g., the housing **210** of FIG. **2**). In an embodiment, the second optical-axis O2 may be substantially parallel to the XY plane while intersecting with the width direction or the longitudinal direction of the housing.

(78) The camera module **405** illustrated in FIG. **6** may be an example of a folded camera or a telephoto camera, and the lenses **453***a*, **453***b*, and **453***c* may be arranged along the width direction (e.g., the direction parallel to the X-axis) of the electronic device **400** or arranged to be moveable upward or backward along the width direction. According to an embodiment, the camera module **405** may include the reflective member **455** configured to receive and then refract or reflect external light, a lens system **453** (a lens assembly) configured such that light refracted or reflected by the reflective member **455** is incident to an image sensor, and/or the image sensor **451** aligned on an optical-axis (e.g., the second optical-axis O2) of the lens system **453**. For example, the image sensor **451** may be configured to receive external light through the reflective member **455** and the lens system **453**. In various embodiments, external light may be incident to the reflective member **455** along the direction of the first optical-axis O1, may be reflected or refracted by the reflective member **455**, and then may be incident to the image sensor **451** through the lens system **453** while traveling along the direction of the second optical-axis O2.

(79) According to various embodiments, for example, the reflective member **455** may include a prism or a mirror, and may be configured to reflect or refract light incident along the direction of the first optical-axis O1 in another direction (e.g., the direction of the second optical-axis O2). In the embodiment, although the configuration, in which the direction of the first optical-axis O1 and the direction of the second optical-axis O2 are substantially perpendicular, is illustrated, various embodiments of the disclosure may not be limited thereto, and the angle, at which the direction of the first optical-axis O1 and the direction of the second optical-axis O intersect with each other, may be various according to the structure of the electronic device **400** or a housing (e.g., the housing **210** of FIG. **2**). In an embodiment, the lens system **453** may be an assembly including at least one lens **453***a*, **453***b*, or **453***c*, the lenses **453***a*, **453***b*, and **453***c* may be arranged along the direction of the second optical-axis O2. In various embodiments, the direction of the first optical-axis O1 may be substantially parallel to the thickness direction (e.g., the Z-axis direction) of the electronic device **400**, and the direction of the second optical-axis O2 may be substantially parallel to the width direction (e.g., the X-axis direction) or the longitudinal direction (e.g., the Y-axis direction) of the electronic device.

(80) According to various embodiments, the electronic device **400** may include a first camera support member **381** or a second camera support member **383**. The first camera support member **381** or the second camera support member **383** may be configured to allow such that at least one of the camera modules **405** and **500** and/or another camera module (e.g., a wide-angle camera, an ultra-wide angle camera, or a close-up camera) adjacent to the camera modules **405** and **500** is

disposed or fixed on the rear plate **380** or inside the camera window **385**. In various embodiments, substantially, the first camera support member **381** or the second camera support member **383** may be a part of a second support member (e.g., the second support member **360** of FIG. **4**) or the first support member (e.g., the first support member **311** of FIG. **4**).

(81) Referring to FIG. **7**, the camera module **500** may include a camera housing **501** and/or a sensor assembly **505**. For example, the camera housing **501** may be configured to accommodate the reflective member **455** and/or the lens system **453**, and may include an opening **517** to allow external light to be incident therein. For example, the opening **517** may be disposed to correspond to one of the transparent regions **387** of FIG. **5** or FIG. **6** on the first optical-axis O1. In various embodiments, the opening **517** may be configured to allow light to pass therethrough and to separate the inner space of the camera housing **501** from the outer space. In an embodiment, the reflective member **455** may be disposed to face the opening **517** in the camera housing **501**. For example, the sensor assembly **505** may include an image sensor (e.g., the image sensor **451** and **551** of FIG. **6** or FIG. **9**), a sensor substrate **553**, a sensor enclosure **555** (e.g., a sub-housing or a holder), and/or a wiring substrate **557**, and may be coupled to the camera housing **501** at a position spaced apart by a designated distance from the opening **517**. The sensor assembly **505** will be described in greater detail below with further reference to the embodiments of FIG. **8** or FIG. **9**.

(82) Although reference numbers of the drawings and detailed descriptions are omitted, the camera modules **405** and **500** or the electronic device **400** may further include a barrel structure for disposing the lenses **453***a*, **453***b*, and **453***c* at a designated position, or a driving device for focus adjustment, focal length adjustment, and/or an image stabilization operation. In various embodiments, in a plane substantially perpendicular to the direction of the second optical-axis O2, the camera modules **405** and **500** or the electronic device **400** may further include a driving device for moving the image sensor **451**, and may be configured to move the image sensor **451** so as to perform an image stabilization operation. In addition, in an embodiment, the image stabilization operation may be implemented by rotating or tilting the reflective member **455** (e.g., a prism). In the image stabilization operation, the reflective member **455** may be rotated or tilted in an angle range of about 1.5 degrees.

(83) According to various embodiments, when combined with a first camera module such as a wide-angle camera, an ultra-wide angle camera, or a close-up camera, a second camera module (e.g., the camera modules **405** and **500** of FIG. **6** or FIG. **7**), which is configured to perform a telephoto function, may be configured to function as a tracking or scan camera which tracks a subject in the region of an image photographed by the first camera module or scans a partial region of the image. In an operation of tracking a subject or scanning a part of an image area, the range of angle, in which the reflective member **455** is rotated or tilted, may be larger than that in the image stabilization operation.

(84) FIG. **8** is a perspective view of a sensor assembly **505** of a camera module (e.g., the camera module **500** of FIG. **7**) according to various embodiments. FIG. **9** is an exploded perspective view of a sensor assembly **505** of a camera module **500** according to various embodiments. FIG. **10** is a diagram illustrating an image sensor **551** of a camera module **500** according to various embodiments.

(85) Referring further to FIG. **8** to FIG. **10**, an image sensor **551** may be disposed on one surface of a sensor substrate **553** and may be electrically connected to the sensor substrate **553** by wire bonding. According to an embodiment, a surface of the image sensor **551**, which receives external light, may include an active region **551***a* and an inactive region **551***b* disposed in at least a part around the active region **551***a*. The "active region **551***a*" may be a region in which sensors (e.g., pixels) for receiving or detecting light are arranged, and may be formed to be spaced apart from the edge of the image sensor **551** by a designated distance (e.g., the width W of the inactive region **551***b*). In an embodiment, the image sensor **551** (e.g., the active region **551***a*) may be substantially aligned on the second optical-axis O2. For example, the inactive region **551***b* may be configured to

provide a designated gap between the edge of the image sensor **551** and the active region **551***a* so as to protect the active region **551***a*, and in various embodiments, may be utilized as a region in which electrical wiring is disposed. For example, "the region in which electrical wiring is disposed" may be understood as a region in which an electrode pad(s) for wire bonding (not shown) is disposed.

(86) According to various embodiments, the image sensor **551** may have one surface having a generally rectangular shape and may include the active region **551***a* on the one surface. For example, one surface of the image sensor **551** or one surface on which the active region **551***a* is disposed, may have an edge including a pair of long sides LS1 and LS2 and a pair of short sides SS1 and SS2, and the long sides LS1 and LS2 and the short sides SS1 and SS2 may be arranged to be substantially perpendicular to each other. According to an embodiment, a first long side LS1 of the pair of long sides LS1 and LS2 may be configured to extend in a first direction (e.g., the horizontal direction of FIG. **10**), and may have a first length L1 in the first direction. A first short side SS1 of the pair of short sides SS1 and SS2 may be configured to extend from one end of the first long side LS1 in a second direction (e.g., the vertical direction in FIG. **10**) intersecting with the first direction, and may have a second length L2 smaller than the first length L1. A second long side LS2 of the pair of long sides LS1 and LS2 may be configured to extend from one end of the first short side SS1 in the first direction, and may have the first length L1. In an embodiment, the second long side LS2 may be spaced apart from the first long side LS1 by the second length L2, and may be configured to be substantially parallel to the first long side LS1. The second short side SS2 of the pair of short sides SS1 and SS2 may be configured to extend from the other end of the second long side LS2 in the second direction so as to be connected to the other end of the first long side LS1, and may have the second length L2. In an embodiment, the second short side SS2 may be spaced apart from the first short side SS1 by the first length L1, and may be configured to be substantially parallel to the first short side SS1.

(87) According to various embodiments, the first length L1 may be understood as a horizontal length of the image sensor **551**, and the second length L2 may be understood as a vertical length of the image sensor **551**. As will be described later, a part of the sensor enclosure **555** may be attached to an edge of one surface (e.g., the surface on which the active region **551***a* is disposed) of the image sensor **551**. According to an embodiment, a part of the sensor enclosure **555** may be attached to one surface of the image sensor **551** at the edge of the side of the first long side LS1 and/or the edge of the side of the second long side LS2. For example, when seen from the direction of the second optical-axis O2, the sensor assembly may have a generally rectangular shape, and even though the sensor enclosure is disposed, the vertical length of the sensor assembly **505** may be substantially the same as the second length L2. According to an embodiment, when the camera module **500** or the sensor assembly **505** is disposed in the electronic device **400**, since the second length L2 is parallel to the thickness direction (e.g., the Z-axis direction of FIG. **2** to FIG. **6**) of the electronic device **400**, the influence of the size of the camera module **500** or the sensor assembly **505** on the size (e.g., the thickness) of the electronic device **400** may be reduced. For example, since the short sides SS1 and SS2 of the image sensor **551** are arranged to be parallel to the thickness direction of the electronic device **400**, the camera module **500** (or the sensor assembly **505**) may be easily mounted in the miniaturized or thinned electronic device **400**. In various embodiments, it may be understood that the short sides SS1 and SS2 of the image sensor **551** are configured to extend in a direction from the first surface (e.g., the first surface **210**A of FIG. **2**) toward the second surface (e.g., the second surface **210**B of FIG. **3**) of a housing. In the arrangement structure, the first long side LS1 and the second long side LS2 may be arranged to intersect with the thickness direction (e.g., the Z-axis direction) or the direction of the first optical-axis O1 of the electronic device **400**, and may be sequentially arranged along the thickness direction or the direction of the first optical-axis O1 of the electronic device **400**.

(88) According to various embodiments, although the first length L1 and the second length L2 of

the image sensor **551** are the same, when the sensor enclosure **555** has been disposed on one surface of the image sensor **551** at the edge corresponding to the first length L1, the sensor assembly **505**, which is seen in the direction of the second optical-axis O2, may have a generally rectangular shape. For example, although the image sensor **551** has a substantially square shape, the vertical length of the sensor assembly **505** may be minimized and/or reduce according to an arrangement of the sensor enclosure **555**.

(89) According to various embodiments, in a state where the image sensor **551** is disposed on the sensor substrate **553**, it may be configured such that an electrical connection (e.g., wire bonding) between the image sensor **551** and the sensor substrate **553** is substantially made at the side of the short side(s) SS1 and SS2 of the image sensor **551**. For example, wire bonding may be configured to electrically connect the sensor substrate **553** and the image sensor **551** by crossing the short side(s) SS1 and SS2 of the image sensor **551**. In various embodiments, in the width direction (e.g., the X-axis direction of FIG. **2** to FIG. **3**) or the longitudinal direction (e.g., the Y-axis direction of FIG. **2** to FIG. **3**) of the electronic device **400**, the gap (e.g., the width W of the inactive region **551***b*) between the edge and the active region **551***a* of the image sensor **551** may be sufficiently secured. For example, the image sensor **551** may have a high freedom degree of size design, in the width direction or longitudinal direction than in the thickness direction of the electronic device **400**. According to an embodiment, in the structure in which a part of the sensor enclosure **555** is disposed on one surface of the image sensor **551** at the side of the long side(s) LS1 and LS2, in the side of the short side SS1 or SS2 of the image sensor **551**, the width W of the inactive region **551***b* may be sufficiently secured such that wire bonding is facilitated.

(90) According to various embodiments, the sensor enclosure **555** may be disposed to surround at least a part of the image sensor **551** on one surface of the sensor substrate **553**. For example, the sensor substrate **553** and the sensor enclosure **555** may be configured to provide a space configured to accommodate the image sensor **551**, and may also be configured to protect the image sensor **551** from contamination by foreign materials. In an embodiment, the sensor enclosure **555** may provide an opening region **555***c* configured to allow external light to be incident to the image sensor **551**, and the camera module **500** or the sensor assembly **505** may further include an optical element **559** (e.g., an infrared blocking filter) which is disposed in the opening region **555***c* of the sensor enclosure **555** so as to at least partially face the image sensor **551**. For example, the optical element **559** may be configured to allow external light to be incident to the image sensor **551**, and may be configured to seal the space provided by the sensor substrate **553** and the sensor enclosure **555**. For example, the image sensor **551** may be configured to detect light incident through the optical element **559** substantially, and a part of the sensor enclosure **555** may be attached to one surface of the image sensor **551** configured to substantially face the optical element **559**. In an embodiment, the optical element **559** may include an infrared blocking filter, and may be configured to block light (e.g., infrared rays) of a wavelength band detected by the image sensor **551** without being identified with the naked eye.

(91) According to various embodiments, another part of the sensor enclosure **555** may be disposed on or attached to the sensor substrate **553** at a position adjacent to the short side(s) SS1 and SS2 of the image sensor **551**. For example, the sensor enclosure **555** may be mechanically or physically coupled or fixed to the sensor substrate **553**, and in a position adjacent to the long side(s) LS1 and LS2, the sensor enclosure **555** may be configured not to be in direct contact with one surface of the image sensor **551**. In an embodiment, the camera module **500** or the sensor assembly **505** may further include a sealing member **555***a* to seal at least a part between the sensor enclosure **555** and the image sensor **551** and/or between the sensor enclosure **555** and the sensor substrate **553**. In various embodiments, a part of the sensor enclosure **555** may be connected, attached, or disposed to one surface of the image sensor **551** by means of the sealing member **555***a*. In an embodiment, the sealing member **555***a* may be formed of an adhesive in a liquid state or a gel state. For example, although FIG. **9** illustrates the sealing member **555***a* having a designated shape, various

embodiments of the disclosure may not be limited thereto. In an embodiment, by applying an adhesive in a liquid state or a gel state, a sealing structure (e.g., the sealing member **555***a*) may be formed or disposed between the sensor enclosure **555** and the image sensor **551** and/or between the sensor enclosure **555** and the sensor substrate **553**.

(92) According to various embodiments, in a position or a region in which a part of the sensor enclosure **555** is disposed on one surface of the image sensor **551**, a part (e.g., the portion indicated as 'SF1' of FIG. **11**) of the side surface of the image sensor **551** may be exposed to the outside through between a side surface (e.g., the portion indicated as 'SF2' in FIG. **11**) of the sensor substrate **553** and a side surface (e.g., the portion indicated as 'SF3' in FIG. **11**) of the sensor enclosure **555**. For example, a portion of the side surfaces of the image sensor **551**, which corresponds to (or is adjacent to) the first long side LS1 or the second long side LS2, may be exposed to the outside of the sensor enclosure **555**. For example, when seen from a direction perpendicular to the second optical-axis O2 or when seen from the direction from the second surface (e.g., the second surface **210**B of FIG. **3**) toward the first surface (e.g., the first surface **210**A of FIG. **2**) of a housing, a part of the side surfaces of the image sensor **551** may be visually seen. In various embodiments, the camera module **500** or the sensor assembly **505** may further include at least one of an adhesive tape **555***b* so as to hide or protect a part (e.g., the side surface) of the image sensor **551**, which is exposed to the outside. A configuration in which a part of the side surface of the image sensor **551** is exposed to the outside or a configuration in which the image sensor **551** is protected by the adhesive tape **555***b*, will be described in more detail through the embodiments of FIG. **11** to FIG. **14**.

(93) According to various embodiments, the wiring substrate **557** may be configured to substantially extend from the sensor substrate **553** and to be coupled to a main circuit board (e.g., the printed circuit board **340** of FIG. **4**), and may include at least partially a flexible printed circuit board. For example, the sensor assembly **505** may be electrically connected to the main circuit board through the wiring substrate **557**. In an embodiment, the wiring substrate **557** may include a first flexible region **557***a* (e.g., a first flexible printed circuit board) configured to extend from the sensor substrate **553**, a rigid region **557***b* (e.g., a rigid printed circuit board) connected to one end of the first flexible region **557***a*, a second flexible region **557***c* (e.g., a second flexible printed circuit board) connected to one end of the rigid region **557***b*, and/or a connection member **557***d* (e.g., a connector) disposed at one end of the second flexible region **557***c*. The rigid region **557***b* may be utilized as a structure for standardizing the arrangement of the wiring substrate **557**. For example, as illustrated in FIG. **7**, the rigid region **557***b* may be disposed on a side surface different from a side surface, on which the sensor substrate **553** is disposed, on the camera housing **501**, and the first flexible region **557***a* may be transformed into an appropriate shape between the sensor substrate **553** and the rigid region **557***b* so as to provide stable electrical wiring. The connection member **557***d* may be substantially coupled to a main circuit board (e.g., the printed circuit board **340** of FIG. **4**) so as to be electrically connected to the main circuit board, and the second flexible region **557***c* is transformed into an appropriate shape between the rigid region **557***b* and the main circuit board so as to provide stable electrical wiring.

(94) According to various embodiments, the camera module **500** or the sensor assembly **505** may be arranged on the electronic device **101**, **102**, **104**, **200**, **300**, or **400** while the long sides LS1 and LS2 are substantially parallel to the X-axis or the Y-axis, and intersect with the Z-axis or the first optical-axis O1. According to an embodiment, the camera module **500** or the sensor assembly **505** may be arranged on the electronic device **101**, **102**, **104**, **200**, **300**, or **400** while the short sides SS1 and SS2 are substantially parallel to the Z-axis, and intersect with the X-axis or the Y-axis. For example, the long sides LS1 and LS2 may be arranged side by side in the width direction or the longitudinal direction of the electronic device **101**, **102**, **104**, **200**, **300**, or **400** so that the sensor assembly **505** or the image sensor **551** has a high design freedom degree with respect to the horizontal width thereof, and the short sides SS1 and SS2 may be arranged side by side in the

thickness direction of the electronic device **101**, **102**, **104**, **200**, **300**, or **400** so that the camera module **500** is easily mounted to the thinned electronic device **101**, **102**, **104**, **200**, **300**, or **400**. In various embodiments, the camera module **500** may have a folded structure (e.g., the reflective member **455** of FIG. **6**). Therefore, it may be easy to secure a moving range or space of a lens(es) (e.g., the lens **453***a*, **453***b*, or **453***c* of FIG. **6**) so that a telephoto function is easily implemented.

(95) FIG. **11** is a sectional view of a sensor assembly **505** of a camera module (e.g., the camera module **500** of FIG. **7**), taken along line B-B′ of FIG. **8**, according to various embodiments. FIG. **12** is a cross-sectional perspective view of a sensor assembly **505** of a camera module **500**, taken along line B-B′ of FIG. **8**, according to various embodiments.

(96) FIG. **11** and FIG. **12** illustrate the short side(s) SS1 or SS2 of the image sensor **551**, and opposite ends of each of the short sides SS1 and SS2 may substantially correspond to the position of the long sides LS1 and LS2. Referring to FIG. **11** and FIG. **12**, a part of the sensor enclosure **555** may be disposed on the edge of one surface of the image sensor **551**, and may be configured not to be in direct contact with the image sensor **551**. In an embodiment, a part SF1 (e.g., the portion adjacent to the long side of FIG. **10**) of the side surfaces of the image sensor **551** may be exposed to the outside through between the side surface SF2 of the sensor substrate **553** and the side surface SF3 of the sensor enclosure **555**. In various embodiments, the sealing member **555***a* may be disposed between the sensor enclosure **555** and one surface of the image sensor **551** and/or between the sensor enclosure **555** and the sensor substrate **553** so as to form a sealing structure, and according to an embodiment, the sealing member **555***a* may be configured to attach the sensor enclosure **555** to the image sensor **551** or the sensor substrate **553**. In FIG. **11**, it is illustrated that a part on the left part of the sensor enclosure **555** is misaligned with the image sensor **551** thereon, and in the case, the sealing member **555***a* may be disposed between the sensor enclosure **555** and the sensor substrate **553** so as to hide the side surface of the image sensor **551**. For example, when seen from the outside, the sensor assembly **505**, in one side surface thereof, may be configured to have a form in which the sensor enclosure **555**, the sealing member **555***a*, the image sensor **551**, and/or the surface of the sensor substrate **553** are successively arranged, and the sensor assembly **505**, in the other side surface thereof, may be configured to have a form in which the sensor enclosure **555**, the sealing member **555***a*, and/or the surface of the sensor substrate **553** are successively arranged.

(97) FIG. **13** is a sectional view of a sensor assembly **505** of a camera module (e.g., the camera module **500** of FIG. **7**), taken along line B-B′ of FIG. **8**, according to various embodiments. FIG. **14** is a cross-sectional perspective view of a sensor assembly **505** of a camera module **500**, taken along line B-B′ of FIG. **8**, according to various embodiments.

(98) Referring to FIG. **13** and FIG. **14**, a part of the sensor enclosure **555** may be substantially disposed on one surface of the image sensor **551**, and a portion of the side surfaces of the image sensor **551**, which corresponds to the long side (e.g., the long side LS1 or LS2 of FIG. **10**), may be substantially exposed to an outer space through the gap between the sensor enclosure **555** and the sensor substrate **553**. In the embodiment, the sealing member **555***a* may be configured to seal the gap between the sensor enclosure **555** and the image sensor **551**. In an embodiment, the adhesive tape **555***b* may be attached from at least one side surface of the sensor enclosure **555** to the side surface of the sensor substrate **553**, and a part of the adhesive tape **555***b* may be configured to hide the side surface of the image sensor **551** or to be attached to the side surface of the image sensor **551**. Although the embodiment of FIG. **14** illustrates an example configuration in which the adhesive tape **555***b* is attached to a part of the side surface of the image sensor **551**, which is exposed to the outside, but it should be noted that various embodiments of the disclosure are not limited thereto. For example, although exposed to the outside of the sensor enclosure **555**, the adhesive tape **555***b* may be attached thereto so as to completely hide the side surface of the image sensor **551** from the outside of the sensor assembly **505**.

(99) FIG. **15** is a sectional view of a sensor assembly **505** of a camera module (e.g., the camera

module **500** of FIG. **7**), taken along line C-C′ of FIG. **8**, according to various embodiments.
(100) FIG. **15** illustrates the long side(s) LS1 or LS2 of the image sensor **551**, and opposite ends of each of the long sides LS1 and LS2 may substantially correspond to the position of the short sides SS1 and SS2. Referring to FIG. **15**, the sensor enclosure **555** may be substantially disposed or fixed to one surface of the sensor substrate **553** at a position adjacent to at least one of the short sides SS1 and SS2 of the image sensor **551**. For example, a structure, which is configured to substantially dispose or fix the sensor enclosure **555**, may be implemented on the sensor substrate **553**. In an embodiment, the sensor enclosure **555** may be configured to seal or close a space in which the image sensor **551** is accommodated and configured not to be substantially in contact with the image sensor **551**. In the structure in which a part of the sensor enclosure **555** is disposed on one surface of the image sensor **551**, the sealing member **555***a* may be provided to form a sealing structure between the sensor enclosure **555** and the image sensor **551** or to attach the sensor enclosure **555** to the image sensor **551** in a state of not being in direct contact therewith.
(101) A camera module (e.g., the camera module **500** of FIG. **7**) or a sensor assembly (e.g., the sensor assembly **505** of FIG. **8** or FIG. **9**) according to various example embodiments of the disclosure may be configured to provide a wire bonding region for the image sensor **551** in a direction (e.g., the X-axis direction or the Y-axis direction of FIG. **4**) or a region having a high design freedom degree, and thus the image sensor or the camera module may be miniaturized in a portion (or a direction) subject to restriction in size such as the thickness direction (e.g., the Z-axis direction in FIG. **4** or FIG. **6**) of an electronic device (e.g., the electronic device **101**, **102**, **104**, **200**, **300**, or **400** of FIG. **1** to FIG. **6**). For example, the wire bonding region is not disposed in the thickness direction (e.g., the upper side or the lower side of the active region **551***a*) of the electronic device **400**, and the wire bonding region and the active region **551***a* may be arranged at the adjacent sides of each other along the width direction or the longitudinal direction of the electronic device **400** on the electronic device **400**. In an embodiment, the sensor enclosure **555** is disposed on one surface of the image sensor **551** in a portion or a direction (e.g., the thickness direction of the electronic device **400** or the Z-axis direction of FIG. **6**) subject to restriction in size, and thus the camera module **500** can be further miniaturized. For example, the camera module **500** according to various embodiments of the disclosure may be configured to provide an environment which allows multiple camera modules to be easily arranged in one electronic device. In addition, in an embodiment, when the camera module **500** has a folded structure including a reflective member (e.g., the reflective member **455** of FIG. **6**), it may be easy to improve the telephoto function of the miniaturized or thinned electronic device **400**.
(102) According to various example embodiments of the disclosure, a camera module (e.g., the camera module **180**, **405**, **500** of FIG. **1**, FIG. **6**, or FIG. **7**) and/or an electronic device (e.g., the electronic device **101**, **102**, **104**, **200**, **300**, or **400** of FIG. **1** to FIG. **6**) including same may include: a sensor substrate (e.g., the sensor substrate **553** of FIG. **7** to FIG. **9** or FIG. **11** to FIG. **15**), an image sensor (e.g., the image sensor **451** or **551** of FIG. **6**, FIG. **9**, FIG. **10**, or FIG. **11** to FIG. **15**) disposed on one surface of the sensor substrate, a sensor enclosure (e.g., the sensor enclosure **555** of FIG. **8**, FIG. **9**, or FIG. **11** to FIG. **15**) disposed on the sensor substrate surrounding at least a part of the image sensor, and an optical element (e.g., the optical element **559** of FIG. **8**, FIG. **9**, or FIG. **15**) comprising a filter disposed in the sensor enclosure facing the image sensor, wherein the image sensor may be configured to detect light incident through the optical element, and the sensor enclosure may be attached to an edge of one surface (e.g., the surface on which the active region **551***a* of FIG. **10** is disposed) of the image sensor at least partially facing the optical element.
(103) According to various example embodiments of the disclosure, the image sensor may include, on the edge of one surface thereof: a first long side (e.g., the first long side LS1 of FIG. **10**) extending in a first direction and having a first length (e.g., the first length L1 of FIG. **10**), a first short side (e.g., the first short side SS1 of FIG. **10**) extending from one end of the first long side in a second direction intersecting with the first direction and having a second length (e.g., the second

length L2 of FIG. **10**) less than the first length, a second long side (e.g., the second long side LS2 of FIG. **10**) extending from one end of the first short side in the first direction and having the first length, and a second short side (e.g., the second short side SS2 of FIG. **10**) extending from one end of the second long side in the second direction to be connected to the other end of the first long side and having the second length, wherein on one surface of the image sensor, a part of the sensor enclosure may be attached to at least one of the first long side or the second long side.

(104) According to various example embodiments of the disclosure, another part of the sensor enclosure may be attached to the one surface of the sensor substrate at a position adjacent to the first short side or the second short side.

(105) According to various example embodiments of the disclosure, the camera module and/or the electronic device including may further include: a sealing member comprising a seal (e.g., the sealing member **555***a* of FIG. **8**, FIG. **9**, or FIG. **11** to FIG. **14**) disposed between a part of the sensor enclosure and the one surface of the image sensor, wherein the sealing member may be configured to join a part of the sensor enclosure to the one surface of the image sensor or to seal a gap between a part of the sensor enclosure and the one surface of the image sensor.

(106) According to various example embodiments of the disclosure, a portion (e.g., the portion indicated as 'SF1' in FIG. **11**) of a side surface of the image sensor, corresponding to the first long side or the second long side, may be exposed between a side surface (e.g., the portion indicated as 'SF2' in FIG. **11**) of the sensor substrate and a side surface (e.g., the portion indicated as 'SF3' in FIG. **11**) of the sensor enclosure.

(107) According to various example embodiments of the disclosure, the camera module and/or the electronic device including same may further include: an adhesive tape (e.g., the adhesive tape **555***b* of FIG. **8**, FIG. **9**, FIG. **13**, or FIG. **14**) attached to extend from a side surface of the sensor enclosure to a side surface of the sensor substrate, wherein a part of the adhesive tape may be attached to a side surface of the image sensor.

(108) According to various example embodiments of the disclosure, the first long side and the first short side may be arranged to be perpendicular to each other.

(109) According to various example embodiments of the disclosure, the camera module and/or the electronic device including same may further include: a reflective member having a reflective surface (e.g., the reflective member **455** of FIG. **6**) configured to receive external light incident from the direction of a first optical-axis and refract or reflect the external light in a direction of a second optical-axis intersecting with the first optical-axis, and at least one lens (e.g., at least one of the lenses **453***a*, **453***b*, and **453***c* of FIG. **6**) disposed between the reflective member and the image sensor along the direction of the second optical-axis and configured to guide or focus light refracted or reflected by the reflective member to the image sensor.

(110) According to various example embodiments of the disclosure, the image sensor may include, on the edge of one surface thereof, a first long side extending in a first direction and having a first length, a first short side extending from one end of the first long side in a second direction intersecting with the first direction and having a second length less than the first length, a second long side extending from one end of the first short side in the first direction and having the first length, and a second short side extending from one end of the second long side in the second direction and connected to the other end of the first long side and having the second length, wherein on one surface of the image sensor, a part of the sensor enclosure may be attached to at least one of the first long side or the second long side.

(111) According to various example embodiments of the disclosure, the first long side and the second long side may extend in a direction intersecting with the first optical-axis and successively arranged along the direction of the first optical-axis.

(112) According to various example embodiments of the disclosure, the first short side and the second short side may be arranged to be parallel to the first optical-axis.

(113) According to various example embodiments of the disclosure, when seen from a direction

perpendicular to the second optical-axis, a portion of a side surface of the image sensor, corresponding to the first long side or the second long side, may be disposed between a side surface of the sensor substrate and a side surface of the sensor enclosure.

(114) According to various example embodiments of the disclosure, the optical element may include an infrared blocking filter.

(115) According to various example embodiments of the disclosure, an electronic device (e.g., the electronic device **101**, **102**, **104**, **200**, **300**, or **400** of FIG. **1** to FIG. **6**) may include: a housing (e.g., the housing **210** of FIG. **2**) including a first surface (e.g., the first surface **210**A of FIG. **1**) facing a first direction and a second surface (e.g., the second surface **210**B of FIG. **3**) facing a second direction opposite to the first direction, and at least one camera module (e.g., the camera module **405** or **500** of FIG. **6** or FIG. **7**) comprising a camera configured to detect light incident through one of the first surface or the second surface, wherein the at least one camera module may include a sensor substrate (e.g., the sensor substrate **553** of FIG. **7** to FIG. **9** or FIG. **11** to FIG. **15**), an image sensor (e.g., the image sensor **451** or **551** of FIG. **6**, FIG. **9**, FIG. **10**, or FIG. **11** to FIG. **15**) disposed on one surface of the sensor substrate, a sensor enclosure (e.g., the sensor enclosure **555** of FIG. **8**, FIG. **9**, or FIG. **11** to FIG. **15**) disposed on the sensor substrate surrounding at least a part of the image sensor, an infrared blocking filter (e.g., the optical element **559** of FIG. **8**, FIG. **9**, or FIG. **15**) disposed in the sensor enclosure facing the image sensor, a reflective member (e.g., the reflective member **455** of FIG. **6**) comprising a reflective surface configured to receive external light incident through one of the first surface or the second surface from the direction of a first optical-axis (e.g., the first optical-axis O1 of FIG. **6**) and refract or reflect the external light in the direction of a second optical-axis (e.g., the second optical-axis O2 of FIG. **6**) intersecting with the first optical-axis, and at least one lens (e.g., the at least one of the lenses **453***a*, **453***b*, and **453***c* of FIG. **6**) disposed between the reflective member and the image sensor along the direction of the second optical-axis and configured to guide or focus light refracted or reflected by the reflective member to the image sensor, wherein the image sensor may be configured to detect light incident through the infrared blocking filter, and at least a part of the sensor enclosure may be attached to an edge of one surface of the image sensor facing the infrared blocking filter.

(116) According to various example embodiments of the disclosure, the at least one lens may be configured to be moved along the direction of the second optical-axis so as to perform focal length adjustment or focus adjustment.

(117) According to various example embodiments of the disclosure, the electronic device described above may further include a display (e.g., the display **201** or **330** of FIG. **2** or FIG. **4**) disposed on the first surface, wherein the camera module may be configured to detect light incident through the second surface.

(118) According to various example embodiments of the disclosure, the image sensor may include, on the edge of one surface thereof, a first long side (e.g., the first long side LS1 of FIG. **10**) extending in a first direction and having a first length (e.g., the first length L1 of FIG. **10**), a first short side (e.g., the first short side SS1 of FIG. **10**) extending from one end of the first long side in a second direction intersecting with the first direction and having a second length (e.g., the second length L2 of FIG. **10**) less than the first length, a second long side (e.g., the second long side LS2 of FIG. **10**) extending from one end of the first short side in the first direction and having the first length, and a second short side (e.g., the second short side SS2 of FIG. **10**) extending from one end of the second long side in the second direction to be connected to the other end of the first long side and having the second length, wherein on one surface of the image sensor, a part of the sensor enclosure may be attached to at least one of the first long side or the second long side.

(119) According to various example embodiments of the disclosure, the first short side or the second short side may extend in a direction from the first surface toward the second surface.

(120) According to various example embodiments of the disclosure, when seen from a direction from the second surface toward the first surface, a portion of a side surface of the image sensor,

corresponding to the first long side or the second long side, may be disposed between a side surface of the sensor substrate and a side surface of the sensor enclosure.
(121) According to various example embodiments of the disclosure, another part of the sensor enclosure may be attached to the sensor substrate at a position adjacent to the first short side or the second short side.
(122) While the disclosure has been illustrated and described with reference to various example embodiments, it will be understood that the various example embodiments are intended to be illustrative, not limiting. It will be further understood by those skilled in the art that various changes in form and detail may be made without departing from the true spirit and full scope of the disclosure, including the appended claims and their equivalents. It will also be understood that any of the embodiment(s) described herein may be used in conjunction with any other embodiment(s) described herein.

## Claims

1. A camera module comprising: a sensor substrate; an image sensor disposed on one surface of the sensor substrate; a sensor enclosure disposed on the sensor substrate surrounding at least a part of the image sensor; and an optical element comprising a filter disposed in the sensor enclosure facing the image sensor, wherein the image sensor is configured to detect light incident through the optical element, and wherein at least a part of the sensor enclosure is attached to an edge of one surface of the image sensor facing the optical element such that a portion of a side surface of the image sensor is exposed to an outside of the sensor enclosure between a side surface of the sensor substrate and a side surface of the sensor enclosure.
2. The camera module of claim 1, wherein the image sensor comprises, on the edge of one surface thereof: a first long side extending in a first direction and having a first length; a first short side extending from one end of the first long side in a second direction intersecting with the first direction and having a second length less than the first length; a second long side extending from one end of the first short side in the first direction and having the first length; and a second short side extending from one end of the second long side in the second direction to be connected to the other end of the first long side and having the second length, wherein on the one surface of the image sensor, a part of the sensor enclosure is attached to at least one of the first long side or the second long side.
3. The camera module of claim 2, wherein another part of the sensor enclosure is attached to the one surface of the sensor substrate at a position adjacent to the first short side or the second short side.
4. The camera module of claim 2, further comprising: a seal disposed between a part of the sensor enclosure and the one surface of the image sensor, wherein the seal is configured to join the part of the sensor enclosure to the one surface of the image sensor or to seal a gap between the part of the sensor enclosure and the one surface of the image sensor.
5. The camera module of claim 2, wherein the portion of the side surface of the image sensor, exposed to the outside of the sensor enclosure, corresponds to the first long side or the second long side.
6. The camera module of claim 5, further comprising: adhesive tape attached to extend from the side surface of the sensor enclosure to the side surface of the sensor substrate, wherein a part of the adhesive tape is attached to the portion of the side surface of the image sensor.
7. The camera module of claim 2, wherein the first long side and the first short side are perpendicular to each other.
8. The camera module of claim 1, further comprising: a reflector comprising a reflective surface configured to receive external light incident from a direction of a first optical-axis and refract or reflect the external light in a direction of a second optical-axis intersecting with the first optical-

axis; and at least one lens disposed between the reflector and the image sensor along the direction of the second optical-axis and configured to guide or focus light refracted or reflected by the reflector to the image sensor.
9. The camera module of claim 8, wherein the image sensor comprises, on the edge of the one surface thereof: a first long side extending in a first direction and having a first length; a first short side extending from one end of the first long side in a second direction intersecting with the first direction and having a second length less than the first length; a second long side extending from one end of the first short side in the first direction and having the first length; and a second short side extending from one end of the second long side in the second direction to be connected to the other end of the first long side and having the second length, wherein on one surface of the image sensor, a part of the sensor enclosure is attached to at least one of the first long side or the second long side.
10. The camera module of claim 9, wherein the first long side and the second long side extend in a direction intersecting with the first optical-axis and are arranged along the direction of the first optical-axis.
11. The camera module of claim 9, wherein the first short side and the second short side are parallel to the first optical-axis.
12. The camera module of claim 9, wherein, when viewed from a direction perpendicular to the second optical-axis, the portion of the side surface of the image sensor, exposed to the outside of the sensor enclosure, corresponds to the first long side or the second long side.
13. The camera module of claim 1, wherein the optical element comprises an infrared blocking filter.
14. An electronic device comprising: a housing comprising a first surface facing a first direction and a second surface facing a second direction opposite to the first direction; and at least one camera module comprising a camera configured to detect light incident through one of the first surface or the second surface, wherein each of the at least one camera module comprises: a sensor substrate; an image sensor disposed on one surface of the sensor substrate; a sensor enclosure disposed on the sensor substrate surrounding at least a part of the image sensor; an infrared blocking filter disposed in the sensor enclosure facing the image sensor; a reflector comprising a reflective surface configured to receive external light incident through one of the first surface or the second surface from a direction of a first optical-axis and refract or reflect the external light in a direction of a second optical-axis intersecting with the first optical-axis; and at least one lens disposed between the reflector and the image sensor along the direction of the second optical-axis and configured to guide or focus light refracted or reflected by the reflector to the image sensor, wherein the image sensor is configured to detect light incident through the infrared blocking filter, and wherein at least a part of the sensor enclosure is attached to an edge of one surface of the image sensor facing the infrared blocking filter such that a portion of a side surface of the image sensor is exposed to an outside of the sensor enclosure between a side surface of the sensor substrate and a side surface of the sensor enclosure.
15. The electronic device of claim 14, wherein the at least one lens is configured to be movable along the direction of the second optical-axis for focal length adjustment or focus adjustment.
16. The electronic device of claim 14, further comprising: a display disposed on the first surface of the housing, wherein the camera module is configured to detect light incident through the second surface.
17. The electronic device of claim 14, wherein the image sensor comprises, on the edge of the one surface thereof: a first long side extending in a first direction and having a first length; a first short side extending from one end of the first long side in a second direction intersecting with the first direction and having a second length less than the first length; a second long side extending from one end of the first short side in the first direction and having the first length; and a second short side extending from one end of the second long side in the second direction to be connected to the

other end of the first long side and having the second length, wherein on one surface of the image sensor, a part of the sensor enclosure is attached to at least one of the first long side or the second long side.

18. The electronic device of claim 17, wherein the first short side or the second short side extend in a direction from the first surface of the housing toward the second surface of the housing.

19. The electronic device of claim 17, wherein, when viewed from a direction from the second surface of the housing toward the first surface of the housing, the portion of the side surface of the image sensor, exposed to the outside of the sensor enclosure, corresponds to the first long side or the second long side.

20. The electronic device of claim 17, wherein another part of the sensor enclosure is attached to the sensor substrate at a position adjacent to the first short side or the second short side.