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Electronic device

Abstract

An electronic device includes: a housing that has a first principal surface, a second principal surface on an opposite side of the first principal surface, and a side surface connecting the first principal surface and the second principal surface; a fan disposed inside the housing; an air passage disposed inside the housing and through which air sent from the fan passes; and a fin disposed in the air passage. The air passage extends from the fan toward the side surface. The housing has a recess recessed from the second principal surface toward the first principal surface and extending toward the side surface, at a position overlapping with the air passage in a plan view. The recess has a recessed surface facing the first principal surface, and a recess side surface positioned nearer to the fin than the side surface is in an extending direction of the air passage.

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Background/Summary

TECHNICAL FIELD

(1) The present disclosure relates to an electronic device.

BACKGROUND ART

(2) There is a known electronic device including a housing for housing a blower, and has an exhaust port for discharging the air to the outside.

(3) An electronic device described in PTL 1 includes a housing for housing a fan unit, for example. The housing has an intake port through which the external air is collected, a first exhaust port that opens to an air passage, and a second exhaust port that opens to a position different from the air passage.

(4) The electronic device according to PTL 1 dissipates the heat inside the electronic device to the outside by absorbing the heat generated by internal electronic components with a heat pipe and heat-dissipating fins, and by causing the fan unit to blow the air against the heat-dissipating fins.

CITATION LIST

Patent Literature

(5) PTL 1: Unexamined Japanese Patent Publication No. 2015-53330

SUMMARY OF THE INVENTION

(6) The electronic device described in PTL 1 still has room for improvement in terms of downsizing the product while improving heat dissipation performance.

(7) Accordingly, an object of the present disclosure is to provide a smaller electronic device with improved heat dissipation performance.

(8) An electronic device according to one aspect of the present disclosure includes: a housing that has a first principal surface, a second principal surface on an opposite side of the first principal surface, and a side surface connecting the first principal surface and the second principal surface; a fan that is disposed inside the housing; an air passage that is disposed inside the housing and through which air sent from the fan passes; and a fin that is disposed in the air passage, wherein the air passage extends from the fan toward the side surface, the housing has a recess recessed from the second principal surface toward the first principal surface and extending toward the side surface, at a position overlapping with the air passage in a plan view, the recess has a recessed surface facing the first principal surface, and a recess side surface positioned closer to the fin than the side surface in an extending direction of the air passage, and that connects the second principal surface and the recessed surface, the side surface has a first exhaust port through which a part of air sent by the fan is discharged, and the recess side surface has a second exhaust port through which another part of the air sent from the fan is discharged.

(9) The present disclosure provides a smaller electronic device with improved heat dissipation performance.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is a perspective view of an electronic device according to a first exemplary embodiment.
(2) FIG. **2** is a schematic diagram of the electronic device in FIG. **1** used as a laptop PC.
(3) FIG. **3** is a perspective view of the electronic device in FIG. **1**, as viewed from another direction.
(4) FIG. **4** is an enlarged view of a part of the electronic device in FIG. **3**.
(5) FIG. **5** is a cross-sectional perspective view of the electronic device in FIG. **4**.
(6) FIG. **6** is a cross-sectional view taken along line A-A of the electronic device in FIG. **4**.
(7) FIG. **7** is an exploded perspective view illustrating a part of an electronic device according to a first modification of the first exemplary embodiment.
(8) FIG. **8** is a cross-sectional perspective view illustrating a part of the electronic device in FIG. **7**.

DESCRIPTION OF EMBODIMENT

Background to Invention

(9) Conventionally, in order to lower the temperature of a heat-generating component inside an electronic device, there is a known configuration including a fan that is disposed inside the electronic device, and that is caused to blow the air so that the internal heat is dissipated to the outside of the electronic device.
(10) For example, PTL 1 discloses an electronic device that dissipates heat by causing a fan unit to blow the air against a heat-dissipating fin having absorbed heat from a heat-generating component. The air sent by the fan unit is discharged to the outside of the electronic device through the first exhaust port.
(11) In order to ensure heat dissipation performance, it is preferable to provide an exhaust port the opening of which has a size substantially equal to the thickness of the heat-dissipating fins, on a side surface of the housing of the electronic device. At the same time, if the exhaust port is provided with a thickness substantially equal to the thickness of the heat-dissipating fins, it becomes difficult to reduce the thickness of the electronic device, so that the downsizing of the product is hindered, disadvantageously.
(12) Therefore, the present inventors have experimented with electronic devices, and came up with the following invention that achieves downsizing while improving heat dissipation performance.
(13) An electronic device according to one aspect of the present disclosure includes: a housing that has a first principal surface, a second principal surface on an opposite side of the first principal surface, and a side surface connecting the first principal surface and the second principal surface; a fan that is disposed inside the housing; and a fin that is disposed in an air passage that is disposed inside the housing and through which air sent from the fan passes, wherein the air passage extends from the fan toward the side surface, the housing has a recess recessed from the second principal surface toward the first principal surface and extending toward the side surface, at a position overlapping with the air passage in a plan view, the recess has a recessed surface facing the first principal surface, and a recess side surface that is positioned nearer to the fin than the side surface in an extending direction of the air passage and that connects the second principal surface and the recessed surface, the side surface has a first exhaust port through which air sent by the fan is discharged, and the recess side surface has a second exhaust port through which the air sent from the fan is discharged.
(14) With such a configuration, it is possible to provide a smaller electronic device, while improving heat dissipation performance.

(15) The first exhaust port may have a size larger than the size of the second exhaust port in the thickness direction of the housing.
(16) Such a configuration can quickly discharge the high-temperature air having cooled the fins.
(17) The second exhaust port may have an opening stretching across the second principal surface and the recess side surface.
(18) Such a configuration enables the high-temperature air having cooled the fins to be discharged in two directions, so that the heat dissipation performance is improved.
(19) The recessed surface may be flat.
(20) Such a configuration can downsize at least a part of the end portion of the electronic device, therefore, contributes to downsizing of the product.
(21) An antenna may be disposed on the recessed surface inside the housing.
(22) Such a configuration enables the antenna to dissipate the heat of the air having cooled the fins, and improves the heat dissipation performance.
(23) The recessed surface may be inclined toward with respect to the first principal surface toward the side surface.
(24) In such a configuration, the channel of the air gradually becomes narrower toward the first exhaust port, so that the flow velocity can be increased, and the heat dissipation performance can be improved.
(25) The fin may be disposed adjacently to the second exhaust port.
(26) With such a configuration, the air having cooled the fin can be discharged directly to the outside of the electronic device, so that the heat dissipation performance can be improved.
(27) The first exhaust port may include a plurality of first through holes, and the second exhaust port may be a plurality of second through holes.
(28) With such a configuration, the first exhaust port and the second exhaust port may be provided as collections of a plurality of small through holes. Therefore, it is possible to prevent foreign substances from getting inside of the electronic device.
(29) The first through hole may have a size larger than the size of the second through hole.
(30) With such a configuration, by making the second through hole that is near the fin small, the flow velocity of the air from the second exhaust port can be increased, so that the heat dissipation performance can be improved.
(31) Furthermore, a display unit may be provided on the first principal surface.
(32) Such a configuration can provide a smaller tablet terminal with improved heat dissipation performance.
(33) Exemplary embodiments will now be explained with reference to some drawings.

First Exemplary Embodiment

(34) [General Configuration]
(35) FIG. **1** is an external perspective view of an electronic device **1** according to a first exemplary embodiment. FIG. **2** is a schematic diagram of electronic device **1** in FIG. **1** used as a laptop PC. The X-Y-Z coordinate system illustrated in the drawings is provided to facilitate the understanding of the exemplary embodiments, and is not intended to limit the scope of the exemplary embodiments in any way. In the X-Y-Z coordinate system, the X-axis direction corresponds to the width direction of the electronic device; the Y-axis direction corresponds to the depth direction; and the Z-axis direction corresponds to the thickness direction.
(36) As illustrated in FIG. **1**, electronic device **1** is a tablet terminal having display unit **10**. As illustrated in FIG. **2**, electronic device **1** may also be used as a laptop PC by connecting to keyboard unit **2** having input devices such as keyboard **201** and touch pad **202** thereto.
(37) FIG. **3** is a perspective view of electronic device **1** in FIG. **1**, as viewed from another direction. FIG. **4** is an enlarged view of a part of electronic device **1** in FIG. **3**. FIG. **5** is a cross-sectional perspective view of electronic device **1** in FIG. **4**. FIG. **6** is a cross-sectional view taken along line A-A of electronic device **1** in FIG. **4**.

(38) As illustrated in FIGS. **3** to **5**, electronic device **1** includes housing **14**, fan **15**, and fins **16**. Fan **15** and fins **16** are disposed inside housing **14**.
(39) <Housing>
(40) As illustrated in FIGS. **1** and **3**, housing **14** has first principal surface **11**, second principal surface **12**, and side surfaces **13** connecting first principal surface **11** and second principal surface **12**. Display unit **10** is provided on first principal surface **11** of electronic device **1**. Second principal surface **12** is a surface on the opposite side of first principal surface **11**. Camera **17**, battery pack **18**, and the like are provided on second principal surface **12** of electronic device **1**. Second principal surface **12** has intake port **19** through which the external air is collected by fan **15**.
(41) As illustrated in FIGS. **3** and **4**, housing **14** has recess **20**. Recess **20** is recessed from second principal surface **12** toward first principal surface **11** and extends toward side surface **13**. Recess **20** is provided at a position overlapping with an air passage in a plan view, that is, in a view in the Y direction. The air passage is a passage for discharging the air from fan **15** to the outside of housing **14**, and extends in the direction of arrow B illustrated in FIG. **3**. The air passage includes air passage B**1** extending from fan **15** to first exhaust port **23**, and air passage B**2** extending from fan **15** to second exhaust port **24** (see FIG. **6**). Recess **20** has recessed surface **21** facing first principal surface **11**, and recess side surface **22** connecting second principal surface **12** and recessed surface **21**. Recess side surface **22** is positioned nearer to fins **16** than side surface **13** in the direction B in which the air passage extends.
(42) Because recess **20** is provided, the thickness of a portion corresponding to recess **20** of housing **14** becomes smaller than other portions. Therefore, recess **20** contributes to downsizing of electronic device **1**.
(43) Recessed surface **21** in the present exemplary embodiment is flat.
(44) First exhaust port **23** is provided on side surface **13**. First exhaust port **23** is an outlet through which the air having passed through air passage B**1** (see FIG. **6**) is discharged. First exhaust port **23** has a plurality of first through holes **23***a*. Second exhaust port **24** is provided on recess side surface **22**. Second exhaust port **24** is an outlet through which the air having passed through air passage B**2** (see FIG. **6**) is discharged. Second exhaust port **24** has a plurality of second through holes **24***a*. First exhaust port **23** and second exhaust port **24** discharge the air from fan **15**. In other words, first exhaust port **23** and second exhaust port **24** are outlets of the air sent by fan **15**. More specifically, as illustrated in FIG. **6**, first exhaust port **23** is an outlet for discharging a part of the air from fan **15**, and second exhaust port **24** is an outlet for discharging another part of the air from fan **15**. The air from fan **15** cools the heat absorbed by fins **16**, and highly heated air resultant of cooling fins **16** is discharged from first exhaust port **23** and second exhaust port **24**.
(45) First exhaust port **23** having the plurality of first through holes **23***a* and second exhaust port **24** having the plurality of second through holes **24***a* prevent foreign substances from getting inside of housing **14** of electronic device **1**. In addition, by changing the sizes of first through holes **23***a* and second through holes **24***a*, it is possible to change the size of the outlet of the air to the outside of housing **14**, and to control the flow velocity of the discharged air.
(46) In the thickness direction of housing **14**, that is, in the Y direction, size H**1** of first exhaust port **23** is larger than size H**2** of second exhaust port **24** (see FIG. **5**). Size H**1** of first exhaust port **23** and size H**2** of second exhaust port **24** herein correspond to the size of the openings in the Y direction. By reducing size H**2** of second exhaust port **24**, the air pressure difference is formed between those before and after the air have passed through second exhaust port **24**, and therefore, can increase the flow velocity of the air discharged from second exhaust port **24**. Therefore, the air is discharged from second exhaust port **24** at a higher flow velocity than that of the air discharged from first exhaust port **23**. As will be described later, highly heated air resultant of cooling fins **16** is discharged from first exhaust port **23** and second exhaust port **24**. By reducing the size H**2** of second exhaust port **24**, it is possible to increase the flow velocity of the air discharged from second exhaust port **24**, so that the high-temperature air can be quickly discharged.

(47) In the present exemplary embodiment, size W1 of first through hole **23***a* is larger than size W2 of second through hole **24***a*. Size W1 of first through hole **23***a* and size W2 of second through hole **24***a* correspond to the sizes of the respective openings in the X direction. By changing the size in the X direction, as well as the size in the Y direction, it is possible to control the flow velocity of the air.

(48) <Fan>

(49) As illustrated in FIG. **5**, fan **15** is disposed inside housing **14** at a position overlapping with intake port **19**. Fan **15** collects the air outside housing **14** through intake port **19**, and sends the air toward first exhaust port **23** and second exhaust port **24**. The air from fan **15** cools fins **16**. An example of fan **15** includes a sirocco fan.

(50) In the present exemplary embodiment, two exhaust ports that are first exhaust port **23** and second exhaust port **24** are provided. Therefore, as illustrated in FIG. **6**, air passage B (see FIG. **3**) from fan **15** is split inside of housing **14** into air passage B**1** leading to first exhaust port **23** and air passage B**2** leading to the second exhaust port. The air from fan **15** passes through air passage B**1** and air passage B**2**, and is discharged to the outside of housing **14** through first exhaust port **23** and second exhaust port **24**. Air passage B**1** and air passage B**2** extend from fan **15** in the −Z direction. In other words, air passage B**1** and air passage B**2** extend from fan **15** and toward side surface **13**.

(51) <Fins>

(52) Fins **16** are disposed inside air passage B that extends from fan **15**. By disposing fins **16** inside air passages B, the air from fan **15** is allowed to cool fins **16**, to pass through air passage B**1** and air passage B**2**, and to be discharged through first exhaust port **23** and second exhaust port **24**.

(53) Fins **16** are connected to a heat pipe (not illustrated) disposed inside housing **14**. The heat pipe transfers the heat generated by a CPU (not illustrated) inside housing **14**, to fins **16**. The air from fan **15** cools fins **16**. The air having cooled fins **16** is discharged from first exhaust port **23** and second exhaust port **24** to housing **14**, to cool the CPU. In this manner, it is possible to prevent electronic device **1** from becoming overly heated.

(54) In the present exemplary embodiment, fins **16** are disposed adjacently to second exhaust port **24**. Because fins **16** are adjacent to second exhaust port **24**, the highly heated air resultant of cooling fins **16** can be discharged quickly to the outside. Because the high-temperature air is discharged quickly through second exhaust port **24**, it is possible to suppress the high-temperature air from remaining inside housing **14**. Hence, the heat dissipation performance of electronic device **1** can be improved.

(55) <Heat Dissipation>

(56) Dissipation of heat from electronic device **1** will now be described with reference to FIGS. **5** and **6**. Fan **15** is rotated about a rotation axis extending in the Y direction. When fan **15** is rotated, the air outside of housing **14** is collected into housing **14** through intake port **19**. By rotating the fan **15**, the collected air is passed through the air passage B**1** and the air passage B**2**, and discharged through first exhaust port **23** and second exhaust port **24** to the outside of housing **14**. Because fins **16** are disposed inside air passages B**1** and B**2**, fins **16** are cooled by the air discharged from fan **15**. The highly heated air resultant of cooling fins **16** is discharged through first exhaust port **23** and second exhaust port **24**, so that the heat is dissipated from electronic device **1**.

(57) In the present exemplary embodiment, because two exhaust ports that are first exhaust port **23** and second exhaust port **24** are provided, the air from fan **15** is split into air passage B**1** and air passage B**2**. Air passage B**1** is a passage of the air from fan **15**, passing through fins **16**, and reaching first exhaust port **23**. Air passage B**2** is a passage of the air from fan **15**, passing through fins **16**, and reaching second exhaust port **24**.

(58) In the present exemplary embodiment, air passage B**1** has duct **25** between fins **16** and first exhaust port **23**. By contrast, air passage B**2** is not provided with any duct between fins **16** and second exhaust port **24**. By providing second exhaust port **24** adjacently to fins **16**, the high heated air having cooled fins **16** can be discharged quickly through second exhaust port **24**. Hence, the

heat dissipation performance of electronic device **1** can be improved.
(59) In general, in order to ensure heat dissipation performance, the sizes of exhaust ports **23** and **24** in the thickness direction (Y direction) of electronic device **1** are preferably substantially the same as the size of fins **16** in the Y direction. This is to discharge the air having cooled fins **16** efficiently. As in the present exemplary embodiment, by providing two exhaust ports **23** and **24**, the size of each of exhaust ports **23** and **24** in the Y direction can be made smaller than the size of fins **16** in the Y direction. As a result, it is possible to reduce the thickness of a part of housing **14**, so that the size of electronic device **1** can be reduced.
(60) In the present exemplary embodiment, size H**1** of first exhaust port **23** in the Y direction is larger than size H**2** of second exhaust port **24** in the Y direction. Therefore, the flow velocity of the air from second exhaust port **24**, which has a smaller size, is increased, and the high-temperature air passed through fins **16** can be discharged to the outside of housing **14** at a higher flow velocity than that of the air discharged from first exhaust port **23**.
(61) In the present exemplary embodiment, the opening of second exhaust port **24** stretches across second principal surface **12** and recess side surface **22**. In this manner, because the openings are provided in a manner stretching across recess side surface **22** and second principal surface **12**, air can be discharged more efficiently, so that heat dissipation efficiency can be improved.
(62) [Effects]
(63) The exemplary embodiment described above provides a smaller electronic device with improved heat dissipation performance.
(64) By providing the two exhaust ports that are first exhaust port **23** and second exhaust port **24**, it is possible to discharge the air from fan **15** through the two air passages that are air passage B**1** and air passage B**2**. Because second exhaust port **24** is provided at a position near fins **16**, the highly heated air resultant of cooling fins **16** can be discharged quickly, so that the heat dissipation performance can be improved.
(65) Because the size of first exhaust port **23** is larger than the size of second exhaust port **24** in the thickness direction of housing **14**, the flow velocity of the air discharged from second exhaust port **24** is increased. Therefore, the highly heated air having cooled fins **16** is discharged from second exhaust port **24** at a high flow velocity, so that the heat dissipation performance can be improved.
(66) Furthermore, by providing recess **20** on second principal surface **12** of housing **14**, the thickness of a part of housing **14** can be reduced. Therefore, it is possible to downsize electronic device **1**.
(67) Furthermore, because recess **20** is provided, a narrow path can be ensured in the duct extending from fins **16** to first exhaust port **23** internal of housing **14**, so that the flow velocity of the air from fan **15** can be increased. Therefore, it is possible to discharge the highly heated air through first exhaust port **23**, too, efficiently.
(68) In addition, because second exhaust port **24** has an opening stretching across second principal surface **12** and recess side surface **22**, it is possible to discharge the highly heated air resultant of cooling fins **16** efficiently, and to improve the heat dissipation performance of electronic device **1**.
(69) In addition, because recessed surface **21** of recess **20** is flat, when electronic device **1** is placed on a desk, a ground, or the like with second principal surface **12** facing downwards, a portion having recess **20** serves as a passage of the air discharged from second exhaust port **24**. As described above, even when electronic device **1** is placed on a desk, a ground, or the like, with second principal surface **12** facing downwards, the air from fan **15** can be discharged efficiently, so that the heat dissipation performance can be improved.
(70) Explained in the above exemplary embodiment is an example of first exhaust port **23** having a larger size than second exhaust port **24** in the thickness direction of housing **14**, but it is not necessarily required for the size of first exhaust port **23** to be larger than the size of second exhaust port **24**. For example, the size of first exhaust port **23** and the size of second exhaust port **24** may be approximately the same. Alternatively, the size of second exhaust port **24** may be larger than the

size of first exhaust port **23**.
(71) Furthermore, the example explained above in the exemplary embodiment is an example including second exhaust port **24** having an opening stretching across second principal surface **12** and recess side surface **22**, but second exhaust port **24** may have an opening at least on recess side surface **22**.
(72) Furthermore, explained above in the exemplary embodiment is an example including flat recessed surface **21**, but it also possible for recessed surface **21** not to be flat. For example, recessed surface **21** may have a curved surface, or recessed surface **21** may have a recess or a protrusion.
(73) In addition, explained above in the exemplary embodiment is an example including fins **16** that are disposed adjacently to second exhaust port **24**, but the position of fins **16** is not limited thereto. Fins **16** may be disposed in such a manner that second exhaust port **24** is positioned nearer to fins **16** than first exhaust port **23**.
(74) In addition, explained above in the exemplary embodiment is an example including first exhaust port **23** including the plurality of first through holes **23***a*, and second exhaust port **24** including the plurality of second through holes **24***a*, but the present invention is not limited thereto. One of first exhaust port **23** and second exhaust port **24** may include a plurality of through holes. Alternatively, both of exhaust ports **23** and **24** may be one through holes, respectively.
(75) In addition, explained above in the exemplary embodiment is an example including electronic device **1** that is a tablet terminal having display unit **10**, but electronic device **1** is not limited to the tablet terminal. For example, electronic device **1** may be electronic device **1** such as a laptop PC or a desktop PC.
(76) [First Modification]
(77) FIG. **7** is an exploded perspective view illustrating a part of an electronic device **1**A according to a first modification of the first exemplary embodiment. FIG. **8** is a cross-sectional perspective view illustrating a part of electronic device **1**A in FIG. **7**.
(78) As illustrated in FIGS. **7** and **8**, in electronic device **1**A, antenna **26** is disposed on recessed surface **21** inside housing **14**. Specifically, resin component **27** including antenna **26** is disposed inside housing **14**, on recessed surface **21**. Antenna **26** can be formed by plating resin component **27**, for example.
(79) Antenna **26** is connected to a wireless communication module (not illustrated), for example, and transmits and receives radio waves to and from the outside, so as to connect electronic device **1** to a network, using a function of a wireless LAN, a wireless WAN, or the like. Because antenna **26** is made of a material having high thermal conductivity such as metal, by disposing antenna **26** on recessed surface **21**, antenna **26** is allowed to dissipate the heat of the air flowing toward first exhaust port **23**. Hence, the heat dissipation performance of electronic device **1**A can be improved. In addition, by disposing antenna **26** on recessed surface **21** inside housing **14**, it is possible to suppress performance deterioration of antenna **26**. For example, when electronic device **1** is placed on a desk, a floor, or the like with second principal surface **12** of housing **14** facing downwards, it is possible to ensure a space between antenna **26** and the desk or the floor. As a result, it becomes possible to suppress interference of radio waves transmitted and received by antenna **26**, and to suppress performance deterioration of antenna **26**. For example, when a desk or a floor contains metal, performance degradation of antenna **26** can be further suppressed.
(80) Recessed surface **21** may be inclined with respect to first principal surface **11** toward side surface **13**. By providing such a recessed surface, antenna **26** can be disposed in a manner inclined with respect second principal surface **12**. In this manner, even when some shielding object is disposed on the side of second principal surface **12** of housing **14**, for example, deteriorations in radiation characteristics, reception characteristics, and/or directivity of antenna **26** can be suppressed.
(81) Distance D**1** between first exhaust port **23** and second exhaust port **24** in the Z direction is preferably 10 mm or more. When distance D**1** between first exhaust port **23** and second exhaust

port **24** is within this range, it is possible to achieve improvements in the characteristics of antenna **26**, in addition to the improvement in the heat dissipation performance of electronic device **1**A.
(82) In addition, because recess **20** is provided, when electronic device **1**A is disposed on a desk, a floor, or the like made of metal, with second principal surface **12** facing downwards, it is possible to prevent deteriorations in characteristics of antenna **26**.

INDUSTRIAL APPLICABILITY

(83) The present disclosure is applicable to a wide range of electronic devices that dissipate heat using fans and fins.

REFERENCE MARKS IN THE DRAWINGS

(84) **1**, **1**A electronic device **10** display unit **11** first principal surface **12** second principal surface **13** side surface **14** housing **15** fan **16** fin **20** recess **21** recessed surface **22** recess side surface **23** first exhaust port **23***a* first through hole **24** second exhaust port **24***a* second through hole **26** antenna

Claims

1. An electronic device comprising: a housing that has a first principal surface, a second principal surface on an opposite side of the first principal surface, and a side surface connecting the first principal surface and the second principal surface; a fan that is disposed inside the housing; an air passage that is disposed inside the housing and through which air sent from the fan passes; and a fin that is disposed in the air passage, wherein the air passage extends from the fan toward the side surface, the housing has a recess recessed from the second principal surface toward the first principal surface and extending toward the side surface, at a position overlapping with the air passage in a plan view, the recess has a recessed surface facing the first principal surface, and a recess side surface that is positioned nearer to the fin than the side surface is in an extending direction of the air passage and that connects the second principal surface and the recessed surface, the side surface has a first exhaust port through which a part of air sent by the fan is discharged, and the recess side surface has a second exhaust port through which another part of the air sent from the fan is discharged.
2. The electronic device according to claim 1, wherein the first exhaust port has a size larger than a size of the second exhaust port in a thickness direction of the housing.
3. The electronic device according to claim 1, wherein the second exhaust port has an opening stretching across the second principal surface and the recess side surface.
4. The electronic device according to claim 1, wherein the recessed surface is flat.
5. The electronic device according to claim 1, further comprising an antenna disposed on the recessed surface inside the housing.
6. The electronic device according to claim 5, wherein the recessed surface is inclined with respect to the first principal surface toward the side surface.
7. The electronic device according to claim 1, wherein the fin is disposed adjacently to the second exhaust port.
8. The electronic device according to claim 1, wherein the first exhaust port has a plurality of first through holes, and the second exhaust port has a plurality of second through holes.
9. The electronic device according to claim 8, wherein a size of each of the plurality of first through holes is larger than a size of each of the plurality of second through holes.
10. The electronic device according to claim 1, further comprising a display unit disposed on the first principal surface.