United States Patent	12393076
Kind Code	B2
Date of Patent	August 19, 2025
Inventor(s)	Lu; Tsung-Che et al.

Electronic device

Abstract

An electronic device is provided. The electronic device includes a first substrate, a polarizer, a conductive pad, and a conductive adhesive. The polarizer is disposed on the first substrate and has an edge. The conductive pad is disposed on the first substrate. The conductive adhesive is disposed on the first substrate. From a top view, the conductive adhesive has a first portion not overlapped with the conductive pad and a second portion overlapped with the conductive pad, and the first portion is disposed between the edge of the polarizer and the second portion. The area of the conductive pad is greater than the area of the second portion.

Inventors: **Lu; Tsung-Che (Miao-Li County, TW), Hsu; Chieh-Hsiang (Miao-Li County, TW), Tsai; Chang-Heng (Miao-Li County, TW)**

Applicant: **InnoLux Corporation** (Miao-Li County, TW)

Family ID: **1000008765559**

Assignee: **INNOLUX CORPORATION (Miao-Li County, TW)**

Appl. No.: **18/647025**

Filed: **April 26, 2024**

Prior Publication Data

Document Identifier	Publication Date
US 20240272472 A1	Aug. 15, 2024

Foreign Application Priority Data

CN	CN202210555630.X	May. 19, 2022

Related U.S. Application Data

continuation parent-doc US 18299861 20230413 US 12001093 child-doc US 18647025

Publication Classification

Int. Cl.: **G02F1/1335** (20060101); **G02F1/1368** (20060101)

U.S. Cl.:

CPC **G02F1/133528** (20130101); **G02F1/1368** (20130101); G02F2202/22 (20130101); G02F2202/28 (20130101)

Field of Classification Search

CPC: G02F (1/133528); G02F (1/1368); G02F (2202/22); G02F (2202/28)

USPC: 349/40

References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
2019/0310507	12/2018	Yamada	N/A	G02F 1/133528
2021/0231999	12/2020	Imazeki	N/A	G09F 9/00

Primary Examiner: Caley; Michael H

Assistant Examiner: Peterson; Illiam D

Attorney, Agent or Firm: McClure, Qualey & Rodack, LLP

Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS (1) This Application is a continuation application of U.S. application Ser. No. 18/299,861, filed on Apr. 13, 2023 (now U.S. Pat. No. 12,001,093), which claims priority of China Patent Application No. 202210555630.X, filed on May 19, 2022, the entirety of which is incorporated by reference herein.

BACKGROUND OF THE INVENTION
Field of the Invention
(1) The present disclosure relates to an electronic device, and, in particular, to an electronic device provided with a conductive adhesive.
Description of the Related Art
(2) With the vigorous development of panel display technology and the reduction of manufacturing costs, panel display devices with advantages such as low radiation, small thickness, and low power consumption are more and more favored by consumers. Therefore, the panel display devices are widely used in electronic devices, such as mobile phones, game consoles, PDAs, etc. In general, panel display devices mainly include plasma display panels (PDPs), liquid crystal displays (LCDs), and organic light-emitting diode (OLED) displays, etc., wherein the liquid crystal display devices

have gradually become the mainstream panel display devices in the market due to its relatively low cost.
(3) During the evolution of electronic devices, in order to meet the demands of high resolution and achieve higher production capacity, the size of display devices has continued to scale down, causing many unresolved problems in the manufacturing process of electronic devices. While existing electronic devices generally meet the needs of the user, they are not entirely satisfactory in every respect. Therefore, it is still necessary to improve the structure of electronic devices in order to manufacture a display device that meets product requirements and has an enhanced visual effect.
BRIEF SUMMARY OF THE INVENTION
(4) An electronic device is provided according to some embodiments of the present disclosure. The electronic device includes a first substrate, a polarizer, a conductive pad, and a conductive adhesive. The polarizer is disposed on the first substrate and has an edge. The conductive pad is disposed on the first substrate. The conductive adhesive is disposed on the first substrate. From a top view, the conductive adhesive has a first portion not overlapped with the conductive pad and a second portion overlapped with the conductive pad, and the first portion is disposed between the edge of the polarizer and the second portion. The area of the conductive pad is greater than the area of the second portion.
(5) In order to make the features or advantages of the present disclosure more comprehensible, some embodiments are illustrated hereinafter, and detailed descriptions are provided with reference to the drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) FIG. **1**A is a top view of an electronic device according to some embodiments of the present disclosure.
(2) FIG. **1**B is a cross-sectional view of an electronic device according to some embodiments of the present disclosure.
(3) FIG. **1**C is a partial enlarged view of the electronic device in FIG. **1**B according to some embodiments of the present disclosure.
(4) FIG. **2** is a top view of an electronic device according to other embodiments of the present disclosure.
DETAILED DESCRIPTION OF THE INVENTION
(5) Hereinafter is a detailed description of the electronic device of the embodiments of the present disclosure. It should be understood that the following description provides many different embodiments for implementing various aspects of some embodiments of the present disclosure. The specific elements and arrangements described below are merely to clearly describe some embodiments of the present disclosure. Of course, these are only used as examples rather than limitations of the present disclosure. Furthermore, similar and/or corresponding reference numerals may be used in different embodiments to designate similar and/or corresponding elements, in order to clearly describe the present disclosure. However, the use of these similar and/or corresponding reference numerals is only for the purpose of simply and clearly description of some embodiments of the present disclosure, and does not imply any correlation between the different embodiments and/or structures discussed.
(6) It should be understood that the drawings of the present disclosure are not drawn to scale, and in fact, the dimensions of elements may be arbitrarily enlarged or reduced in order to clearly represent the features of the present disclosure.
(7) In addition, when referring to “a layer is on or over another layer”, it may refer to the case where the layer is in direct contact with another layer. Alternatively, it may also be the case that the

layer is not in direct contact with another layer. In this case, one or more intermediate layers are disposed between the layer and another layer.
(8) It should be understood that ordinal numbers such as "first", "second", and the like used in the specification and claims are used to modify elements and are not intended to imply and represent the element(s) have any previous ordinal numbers, and do not represent the order of a certain element and another element, or the order of the manufacturing method. The use of these ordinal numbers is only used to clearly distinguish an element with a certain name and another element with the same name. The claims and the specification may not use the same terms, for example, a first element in the specification may be a second element in the claims.
(9) The term "about" used herein generally means within 10%, within 5%, within 3%, within 2%, within 1%, or within 0.5% of a given value or a given range. The value given herein is an approximate value, that is, the meaning of "about" may still be implied without the specific description of "about". Furthermore, the phrase "a range is greater than or equal to a first value, and the range is less than or equal to a second value" means that the range includes the first value, the second value, and other values in between.
(10) Unless otherwise defined, all terms including technical and scientific terms used herein have the same meaning as commonly understood by a person of ordinary skills in the art. It should be understood that these terms, such as those defined in commonly used dictionaries, should be interpreted as having meanings consistent with the relevant art and the background or context of the present disclosure, and should not be interpreted in an idealized or overly formal manner, unless otherwise defined in the embodiments of the present disclosure.
(11) According to some embodiments of the present disclosure, an optical microscope (OM), a scanning electron microscope (SEM), a film thickness profilometer (α-step), an ellipsometer, or other suitable methods may be used to measure the spacing or distance between elements, or the width, thickness, height, or area of each element. In detail, according to some embodiments, a scanning electron microscope may be used to obtain a cross-sectional structure image including the element to be measured, and measure the pitch or distance between each element, or the width, thickness, height, or area of each element.
(12) It should be understood that in the following embodiments without departing from the spirit of the present disclosure, features in several different embodiments may be replaced, combined, and recombined to become other embodiments. As long as the features of the embodiments do not violate the spirit or conflict with each other, they may be arbitrarily recombined and used.
(13) According to some embodiments of the present disclosure, an electronic device is provided. The electronic device includes a polarizer and conductive adhesive disposed on a first substrate. The conductive adhesive is adjacent to an edge of the polarizer, and an angle between the extending direction and an absorption-axis direction of the polarizer is between 80° and 100°. In this way, the possibility of the conductive adhesive being penetrated into the polarizer in a humid and warm environment may be reduced, thereby affecting the visual effect of the peripheral area of the electronic device.
(14) It should be understood that, in addition to display devices, the embodiments of the present disclosure may be applied to various electronic devices, such as light emitting devices, touch devices, sensing devices, antenna devices, splicing devices, or combinations thereof, but the present disclosure is not limited thereto. The electronic device may be a bendable or flexible electronic device. The electronic device may include, for example, light-emitting diodes, liquid crystals, fluorescence, phosphors, other suitable display media, or combinations thereof, but the present disclosure is not limited thereto. The light emitting diode may include, for example, organic light-emitting diodes (OLEDs), inorganic light-emitting diodes (LEDs), mini-light-emitting diodes (mini-LEDs), micro-light-emitting diodes (micro-LEDs), quantum dots (QDs) light-emitting diodes (such as QLEDs, QDLEDs), other suitable materials, or any permutation and combination thereof, but the present disclosure is not limited thereto. The display device may include, for example, a

spliced display device, but the present disclosure is not limited thereto. The concepts or principles of the present disclosure may also be applied to non-self-illuminating liquid crystal displays (LCDs), but the present disclosure is not limited thereto.
(15) The antenna device may be, for example, a liquid crystal type antenna device or a non-liquid crystal type antenna device, but the present disclosure is not limited thereto. The antenna device may include, for example, a splicing antenna device, but the present disclosure is not limited thereto. The sensing device may be a sensing device for sensing capacitance, light, heat, or ultrasonic, but the present disclosure is not limited thereto. It should be noted that the electronic device may be any permutation and combination thereof, but the present disclosure is not limited thereto. In addition, the shape of the electronic device may be rectangular, circular, polygonal, with curved edges, or other suitable shapes. The electronic device may have peripheral systems such as a driving system, a control system, and a light source system to support a display device, an antenna device, or a splicing device. The electronic device of the present disclosure may be, for example, a display device, but the present disclosure is not limited thereto.
(16) FIGS. **1**A and **1**B are respectively a top view and a cross-sectional view of an electronic device **10** according to some embodiments of the present disclosure. It should be noted that the cross-sectional view of FIG. **1**B is taken along the section line AA′ in FIG. **1**A. Referring to FIGS. **1**A and **1**B, the electronic device **10** includes a first substrate **100**, a polarizer **104**, and a conductive adhesive **106**. The polarizer **104** and the conductive adhesive **106** are disposed on the first substrate **100**. As shown in FIG. **1**B, the polarizer **104** has a conductive layer **1042**, and the conductive adhesive **106** is electrically connected to the conductive layer **1042** of the polarizer **104**. In some embodiments, the conductive layer **1042** of the polarizer **104** may be used as an antistatic layer, which may reduce the impact of excessive static charges accumulated on the surface of the electronic device **10** on the touch effect of the electronic device **10**. The conductive adhesive **106** electrically connected to the conductive layer **1042** may provide a static conduction path for the electronic device **10**, so as to transfer the static electricity accumulated on the surface of the electronic device **10** to other conductive structures on the first substrate **100**, thereby improving the display quality and touch effect of the electronic device **10**.
(17) In some embodiments, although not explicitly shown in FIGS. **1**A and **1**B and subsequent drawings, the first substrate **100** may include, for example, a base substrate, a thin film transistor layer (TFT layer) disposed on the base substrate and used as a driving circuit, an electrode layer disposed on the base substrate and electrically connected to the thin film transistor layer, and/or an alignment layer disposed on the thin film transistor layer and the electrode layer. The alignment layer may be used to align the liquid crystal molecules in the liquid crystal layer to have a desired orientation.
(18) In some embodiments, the conductive layer **1042** of the polarizer **104** may include, for example, pressure sensitive adhesive (PSA), but the present disclosure is not limited thereto. In some embodiments, the material of the conductive layer **1042** may contain carboxyl groups, hydroxyl groups, esters, or combinations thereof, but the present disclosure is not limited thereto. According to some embodiments, a surface resistance of the conductive layer **1042** may be between about 10.sup.8Ω/□ (i.e. Ω/square, Ω/sq, or Ω/m.sup.2) and about 10.sup.10Ω/□, such as about 2.5×10.sup.8Ω/□, about 5×10.sup.8Ω/□, 7.5×10.sup.8Ω/□, or about 1.5×10.sup.9Ω/□. In some embodiments, the thickness **1042**T of the conductive layer **1042** in a normal direction of the first substrate **100** (e.g., the Z-axis in FIG. **1**B) may be between 1 μm and 30 μm, for example, about 10 μm. The conductive layer **1042** whose resistance and thickness are within the above range may maintain good touch sensitivity and achieve desired antistatic effect. In some embodiments, the material of the conductive adhesive **106** may include copper, silver, or alloys thereof, but the present disclosure is not limited thereto.
(19) As shown in FIG. **1**A, the conductive adhesive **106** is adjacent to an edge of the polarizer **104** and extends laterally along a horizontal direction (e.g., the X-axis in FIG. **1**A). Furthermore, an

angle between the extending direction of the conductive adhesive **106** and an absorption-axis direction of the polarizer **104** is between 80 degrees and 100 degrees, such as about 90 degrees. During the fabrication of the polarizer **104**, sub-layers in the polarizer **104** are stretched to have the absorption-axis extending along a specific direction. However, when the sub-layers of the polarizer **104** are stretched, the sub-layers shrink along a direction perpendicular to the stretching direction, resulting in misalignment between the sub-layers of the polarizer **104**. If the conductive adhesive **106** is formed along the edge occurring shrinks of the sub-layers of the polarizer **104**, the conductive adhesive **106** may be penetrated into the polarizer **104** in a humid and warm environment. Therefore, when the conductive adhesive **106** is designed to have the angle between the extension direction and the absorption-axis direction of the polarizer **104** within the above range, the probability of the conductive adhesive **106** being penetrated into the polarizer **104** may be reduced, thereby maintaining the visual effect of the periphery area of the electronic device **10**. Furthermore, the above design is also conducive to the development of the electronic device **10** toward extremely narrow borders.

(20) According to some embodiments, an absorption-axis direction of a polarizer to be tested may be determined by using a polarizer with a known absorption-axis direction. In detail, firstly, the polarizer with the known absorption-axis direction is overlapped with the polarizer to be tested. Next, the polarizer is rotated with the known absorption-axis direction until light cannot pass through the two polarizers. When the light cannot pass through the two overlapping polarizers, the absorption-axis directions of the two polarizers are perpendicular to each other, so the absorption-axis direction of the polarizer to be tested may be obtained. In other embodiments, the absorption-axis direction may be measured by a spectrometer (such as a spectrometer of the type JASCO V-7100). This apparatus may inject an incident light into a linear polarizer to form a linear polarized light. This linear polarized light enters the sample to be tested, and the optical properties (absorption-axis angle, polarization degree, transmittance, etc.) of the sample to be tested may be obtained by rotating with different angles, but the present disclosure is not limited thereto.

(21) According to some embodiments, as shown in FIG. **1**B, the polarizer **104** may further include a polarizing film **1044**. In some embodiments, the conductive adhesive **106** may be in contact with the edge of the polarizer **104**. In an embodiment, the conductive adhesive **106** is at least in contact with the conductive layer **1042** of the polarizer **104**. In an embodiment, the conductive adhesive **106** may be in contact with both the conductive layer **1042** and the polarizing film **1044** of the polarizer **104**. Although not explicitly shown in FIG. **1**B and subsequent drawings, it should be understood that according to different embodiments, the polarizing film **1044** of the polarizer **104** may be a single-layer structure or a multi-layer structure including multi-sub-polarizing films. The sub-polarizing film in the multi-layer structure may be a functional film layer that provides at least one of the functions such as anti-reflection, anti-glare, anti-fouling, and enhancement of light transmittance.

(22) According to some embodiments, as shown in FIGS. **1**A and **1**B, the interface where the conductive adhesive **106** is in contact with the polarizer **104** is the contact region **106**CR, and a portion of the contact region **106**CR is the region where the conductive adhesive **106** is in contact with the conductive layer **1042**. In some embodiments, in the top view shown in FIG. **1**A, the length **106**L of the region where the conductive adhesive **106** is in contact with the conductive layer **1042** along the extending direction of the conductive adhesive **106** (e.g., the X-axis in FIG. **1**A) may be greater than about 10% of the width **104**W of the polarizer **104** along the extension direction of the conductive adhesive **106** (e.g., the X-axis in FIG. **1**A), such as greater than about 20%, about 30%, about 40%, about 50%, about 60%, about 70%, about 80%, or about 90%. If the length **106**L is too short, such as less than about 10% of the width **104**W, the conductive adhesive **106** may not effectively conduct the static electricity accumulated on the surface of the electronic device **10**. Furthermore, in some embodiments, the length **106**L of the region where the conductive adhesive **106** is in contact with the conductive layer **1042** along the extending direction of the

conductive adhesive **106** (e.g., the X-axis in FIG. **1**A) may be equal to the width **104**W of the polarizer **104** along the extension direction of conductive adhesive **106** (e.g., the X-axis in FIG. **1**A).

(23) According to some embodiments, as shown in FIG. **1**B, the contact region **106**CR may have a width **106**W along the normal direction of the first substrate **100** (e.g., the Z-axis in FIG. **1**B). That is, the width **106**W is the height of the contact interface between the conductive adhesive **106** and the polarizer **104**. In some embodiments, the width **106**W may be greater than or equal to the thickness **1042**T of the conductive layer **1042** of the polarizer **104** in the normal direction of the first substrate **100** (e.g., the Z-axis in FIG. **1**B). In some embodiments, the width **106**W may be between about 1 μm and about 250 μm.

(24) In some embodiments, the electronic device **10** may further include a second substrate **102**. The second substrate **102** is disposed between the first substrate **100** and the polarizer **104**. As shown in FIG. **1**B, the conductive adhesive **106** may be further disposed on the second substrate **102**. According to some embodiments, the second substrate **102** may include a base substrate, and the base substrate may include a color filter and a light shielding layer. In an embodiment, the second substrate **102** may further include an alignment layer. In an embodiment in which the second substrate **102** includes an alignment layer, the alignment layer may be disposed on a side of the base substrate not disposed with the polarizer **104**. In some other embodiments, the second substrate may not include the color filter and the light-shielding layer, but the present disclosure is not limited thereto. The base substrates of the first substrate **100** and the second substrate **102** of the present disclosure may be, for example, flexible or inflexible substrates, and the materials may include plastic, glass, quartz, sapphire, ceramics, carbon fiber, other suitable substrate materials, or combinations thereof, but the present disclosure is not limited thereto. In some embodiments, the above plastic materials may include polyimide (PI), polyethylene terephthalate (PET), polycarbonate (PC), and other suitable materials, or combinations thereof, but the present disclosure is not limited thereto. In some other embodiments, the second substrate **102** may be replaced by an encapsulation layer. The encapsulation layer may provide protection, encapsulation, and/or planarization functions for the display units, and the encapsulation layer may include organic materials, inorganic materials, combinations thereof, or mixtures thereof, but the present disclosure is not limited thereto.

(25) In some embodiments, the polarizer **104** may be in contact with the second substrate **102**. In an embodiment, the polarizer **104** may be in contact with the second substrate **102** directly. More specifically, in an embodiment, the conductive layer **1042** of the polarizer **104** may be in contact with the second substrate **102**. According to some embodiments, as shown in FIG. **1**B, the conductive adhesive **106** may have a thickness **106**T**2** from an upper surface **102**US of the second substrate **102** to a topmost surface **106**TS of the conductive adhesive **106**. In some embodiments, the thickness **106**T**2** may be smaller than the thickness **104**T of the polarizer **104** in the normal direction of the first substrate **100** (e.g., the Z-axis in FIG. **1**B). The thickness **106**T**2** of the conductive adhesive **106** is smaller than the thickness **104**T of the polarizer **104**. That is, the level of the topmost surface **106**TS of the conductive adhesive **106** is lower than the upper surface of the polarizer **104**, which may reduce the risk of light leakage and reduce the possibility of damage during the assembly process of the electronic device **10**.

(26) In some embodiments, the thickness **106**T**2** of the conductive adhesive **106** may be between about 1 μm and about 250 μm. In some embodiments, the thickness **104**T of the polarizer **104** may be between about 50 μm and about 250 μm.

(27) Still referring to FIGS. **1**A and **1**B, in some embodiments, the electronic device **10** may further include a conductive pad **108**. The conductive pad **108** may be disposed on the first substrate **100**. In detail, in an embodiment, the conductive pad **108** may be disposed on a portion of the first substrate **100** that does not overlap with the second substrate **102**. In some embodiments, in addition to disposing the conductive pad **108**, the portion of the first substrate **100** that does not

overlap with the second substrate **102** may be used as a region electrically connected to a flexible printed circuit board, a region electrically connected to a driving integrated circuit chip, or a region bonded with a driving integrated circuit chip, but the present disclosure is not limited thereto.

(28) According to some embodiments, the conductive pad **108** may be electrically connected to the conductive adhesive **106** to further provide a path for the static electricity transmitted through the conductive adhesive **106** to discharge. In some embodiments, as shown in FIG. **1**B, the conductive adhesive **106** may be formed on the conductive pad **108** and extend from the conductive pad **108** to the first substrate **100** and the second substrate **102**. According to some embodiments, the material of the conductive pad **108** may include aluminum (Al), copper (Cu), molybdenum (Mo), titanium (Ti), platinum (Pt), iridium (Ir), nickel (Ni), chromium (Cr), silver (Ag), gold (Au), tungsten (W), or alloys thereof, but the present disclosure is not limited thereto.

(29) Still referring to FIG. **1**B, in some embodiments, the electronic device **10** may further include a liquid crystal layer **103**. The liquid crystal layer **103** is sandwiched between the first substrate **100** and the second substrate **102**. In some embodiments, as shown in FIGS. **1**A and **1**B, the projection planes of the liquid crystal layer **103** and the second substrate **102** on the first substrate **100** may overlap each other. Therefore, in the top view of FIG. **1**A, the second substrate **102** may cover the liquid crystal layer **103**.

(30) Still referring to FIG. **1**B, in some embodiments, an additional polarizer **110** may be disposed on the side of the first substrate **100** not disposed with the liquid crystal layer **103**. Likewise, the polarizer **110** may have a similar or the same composition to polarizer **104**. According to some embodiments, the polarizer **110** may be a single-layer structure or a multi-layer structure including multi-sub-polarizing films. The sub-polarizing film in the multi-layer structure may be a functional film layer that provides at least one of the functions, such as anti-reflection, anti-glare, anti-fouling, and enhancement of light transmittance.

(31) Next, referring to FIG. **1**C, FIG. **1**C is a partial enlarged view of the electronic device **10** shown in FIG. **1**B according to some embodiments of the present disclosure. It should be noted that FIG. **1**C is taken from the region R in FIG. **1**B. According to some embodiments, the polarizing film **1044** of the polarizer **104** may include sub-polarizing films **1044**A, **1044**B and **1044**C. Although the polarizing film **1044** is only shown as having three layers of sub-polarizing films (the sub-polarizing films **1044**A, **1044**B, and **1044**C) in FIG. **1**C, the present disclosure is not limited thereto. In other embodiments, the polarizing film **1044** may include less layers or more layers of sub-polarizing films.

(32) As described above, when forming the polarizer **104**, the sub-layers in the polarizer **104** (e.g., the sub-polarizing films **1044**A, **1044**B, and **1044**C in FIG. C) are stretched to have absorption axes extending along a specific direction. However, when the sub-layers of the polarizer **104** are stretched, the sub-layers are shrunk along a direction perpendicular to the stretching direction, resulting in misalignment between the sub-layers of the polarizer **104**. As shown in FIG. **1**C, if an angle between the extending direction of the conductive adhesive **106** and the absorption-axis direction of the polarizer **104** is about 80 degrees and about 100 degrees, the sub-polarizing films **1044**A, **1044**B, and **1044**C of the polarizer **104** may not have retracted edges in the extending direction of the conductive adhesive **106** (e.g., the X-axis in FIG. **1**C). Therefore, the penetration of the conductive adhesive **106** into the polarizer **104** may be reduced, thereby affecting the display effect of the electronic device **10**.

(33) Referring to FIG. **2**. FIG. **2** is a top view of an electronic device **20** according to other embodiments of the present disclosure. The electronic device **20** of FIG. **2** is similar to the electronic device **10** of FIG. **1**A, except that the conductive adhesive **106** of the electronic device **20** extends along a different direction than the conductive adhesive **106** in the electronic device **10**. Specifically, as shown in FIG. **2**, the conductive adhesive **106** may be adjacent to the edge of the polarizer **104** and extend longitudinally along the Y-axis. In an embodiment, a portion of the conductive adhesive **106** extending along the edge of the polarizer **104** may be in contact with the

edge of the polarizer **104**.
(34) Furthermore, an angle between the extending direction of the conductive adhesive **106** in the electronic device **20** and the absorption-axis direction of the polarizer **104** may be between about 80 degrees and about 100 degrees, such as about 90 degrees. Likewise, the angle between the extension direction of the conductive adhesive **106** and the absorption-axis direction of the polarizer **104** in the above range may reduce the penetration of the conductive adhesive **106** into the polarizer **104**, thereby affecting the visual effect of the peripheral area of the electronic device **20**. Furthermore, the above design is also conducive to the development of the electronic device **20** toward extremely narrow borders.
(35) In the embodiment shown in FIG. **2**, the length of the interface where the conductive adhesive **106** is in contact with the polarizer **104** along the extending direction of the conductive adhesive **106** (e.g., the Y-axis in FIG. **2**) may be greater than about 10% of the length of the polarizer **104** along the extension direction of the conductive adhesive **106**, such as greater than about 20%, about 30%, about 40%, about 50%, about 60%, about 70%, about 80%, or about 90%. If the length of the interface where the conductive adhesive **106** is in contact with the polarizer **104** along the extending direction of the conductive adhesive **106** (e.g., the Y-axis in FIG. **2**) is too short, such as less than about 10% of the length of the polarizer **104** along the extension direction of the conductive adhesive **106**, the conductive adhesive **106** may not effectively conduct the static electricity accumulated on the surface of the electronic device **20**. Furthermore, in some embodiments, the length of the interface where the conductive adhesive **106** is in contact with the conductive layer **1042** along the extending direction of the conductive adhesive **106** (e.g., the Y-axis in FIG. **2**) may be equal to the length of the polarizer **104** along the extension direction of conductive adhesive **106**.
(36) As mentioned above, according to some embodiments of the present disclosure, the electronic device includes a polarizer and a conductive adhesive disposed on a first substrate. The conductive adhesive is adjacent to an edge of the polarizer, and an angle between an extension direction of the conductive adhesive and an absorption-axis direction of the polarizer is between 80° and 100°. As such, the possibility of the conductive adhesive being penetrated into the polarizer in a humid and warm environment may be reduced, which may otherwise negatively affect the visual effect of the peripheral area of the electronic device.
(37) Although some embodiments of the present disclosure and their advantages have been disclosed above, it should be understood that a person of ordinary skill in the art may change, replace and/or modify the present disclosure without departing from the spirit and scope of the present disclosure. The features between the embodiments of the present disclosure may be arbitrarily combined as long as they do not violate or conflict with the spirit of the present disclosure. In addition, the scope of the present disclosure is not limited thereto the process, machine, manufacturing, material composition, device, method, and step in the specific embodiments described in the specification. A person of ordinary skill in the art will understand current and future process, machine, manufacturing, material composition, device, method, and step from the content disclosed in the present disclosure, as long as the current or future process, machine, manufacturing, material composition, device, method, and step performs substantially the same functions or obtain substantially the same results as the present disclosure. Therefore, the scope of the present disclosure includes the above-mentioned process, machine, manufacturing, material composition, device, method, and steps. The scope of the present disclosure should be determined by the scope of the claims. It is not necessary for any embodiment or claim of the present disclosure to achieve all of the objects, advantages, and/or features disclosed herein.

Claims

1. An electronic device, comprising: a first substrate; a polarizer disposed on the first substrate and having an edge; a conductive pad disposed on the first substrate; and a conductive adhesive disposed on the first substrate; wherein from a top view, the conductive adhesive has a first portion not overlapped with the conductive pad and a second portion overlapped with the conductive pad, and the first portion is disposed between the edge of the polarizer and the second portion; wherein from the top view, the first portion and the second portion form a bent shape, and an angle formed by the bent shape is greater than 0 degrees and less than 180 degrees; wherein an area of the conductive pad is greater than an area of the second portion.
2. The electronic device as claimed in claim 1, wherein the edge extends in a first direction.
3. The electronic device as claimed in claim 1, wherein the first portion does not overlapped with the polarizer.
4. The electronic device as claimed in claim 1, further comprising a second substrate disposed between the polarizer and the first substrate, wherein the second substrate and the polarizer are in contact with the first portion.
5. The electronic device as claimed in claim 1, wherein the conductive pad is in contact with and electrically connected to the second portion.
6. The electronic device as claimed in claim 1, wherein the conductive adhesive and the polarizer have a contact region, and a length of a portion of the contact region along a first direction is greater than 10% of a width of the polarizer along the first direction from the top view.
7. The electronic device as claimed in claim 1, wherein the polarizer comprises a polarizing film and a conductive layer, and a side well of the polarizing film is in contact with the conductive adhesive.
8. The electronic device as claimed in claim 7, wherein the conductive adhesive is electrically contacted with the conductive layer of the polarizer.
9. The electronic device as claimed in claim 8, wherein the conductive adhesive is in contact with both the conductive layer and the polarizing film of the polarizer.