



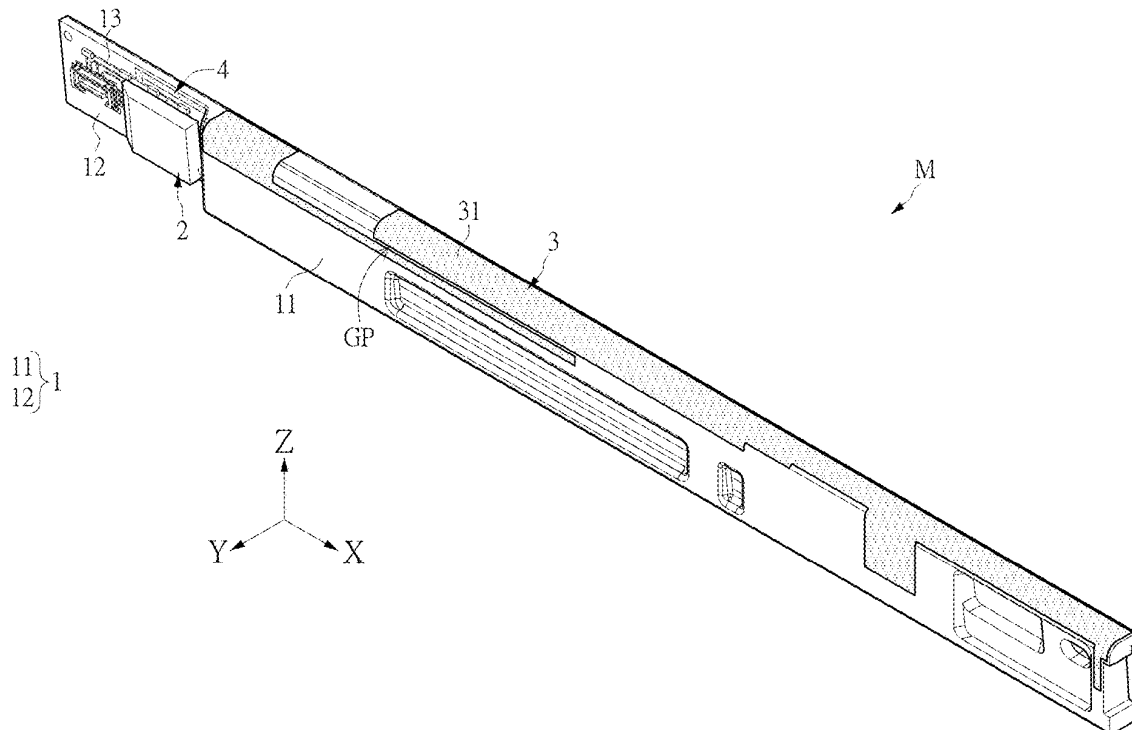
US 20250015499A1

(19) **United States**(12) **Patent Application Publication**
HO et al.(10) **Pub. No.: US 2025/0015499 A1**(43) **Pub. Date: Jan. 9, 2025**(54) **ANTENNA STRUCTURE AND ELECTRONIC
DEVICE**(71) Applicant: **WISTRON NEWEB
CORPORATION, HSINCHU (TW)**(72) Inventors: **WEN-PIN HO, HSINCHU (TW);
SHIH-KAI HSU, HSINCHU (TW);
CHING-WEN CHEN, HSINCHU
(TW); KAI SHIH, HSINCHU (TW)**(21) Appl. No.: **18/752,975**(22) Filed: **Jun. 25, 2024****Related U.S. Application Data**(60) Provisional application No. 63/512,094, filed on Jul.
6, 2023.(30) **Foreign Application Priority Data**

Jun. 17, 2024 (TW) 113122260

Publication Classification(51) **Int. Cl.**
H01Q 9/04 (2006.01)
H01Q 1/22 (2006.01)(52) **U.S. Cl.**
CPC **H01Q 9/0414** (2013.01); **H01Q 1/2291**
(2013.01); **H01Q 9/045** (2013.01)(57) **ABSTRACT**

An antenna structure and an electronic device are provided. The electronic device includes a housing and an antenna structure disposed in the housing. The antenna structure includes a carrier having a first carrying part and a second carrying part connected to each other, a switching circuit, a first radiating element, and a second radiating element. A thickness of the first carrying part is greater than a thickness of the second carrying part. The second carrying part includes a circuit layer and a ground layer respectively formed on opposite surfaces of the second carrying part. The switching circuit is located on the circuit layer. The first radiating element and the second radiating element are disposed on the carrier and respectively electrically connected to a feed element and the switching circuit. The second radiating element and the first radiating element are apart from and couple with each other.





US 20250015480A1

(19) **United States**

(12) **Patent Application Publication**
LEE et al.

(10) **Pub. No.: US 2025/0015480 A1**

(43) **Pub. Date: Jan. 9, 2025**

(54) **ELECTRONIC DEVICE COMPRISING
ANTENNA STRUCTURE**

Publication Classification

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

(51) **Int. Cl.**
H01Q 1/22 (2006.01)
H01Q 1/48 (2006.01)
H01Q 9/04 (2006.01)
H01Q 9/40 (2006.01)

(72) Inventors: **Minkyung LEE**, Suwon-si (KR);
Woosuk KANG, Suwon-si (KR);
Yunsik KIM, Suwon-si (KR);
Mincheol SEO, Suwon-si (KR);
Kyungmoon SEOL, Suwon-si (KR);
Donghun SHIN, Suwon-si (KR);
Changha YU, Suwon-si (KR); **Gyubok
PARK**, Suwon-si (KR)

(52) **U.S. Cl.**
CPC **H01Q 1/22** (2013.01); **H01Q 1/48**
(2013.01); **H01Q 9/0421** (2013.01); **H01Q**
9/40 (2013.01)

(21) Appl. No.: **18/893,657**

(22) Filed: **Sep. 23, 2024**

Related U.S. Application Data

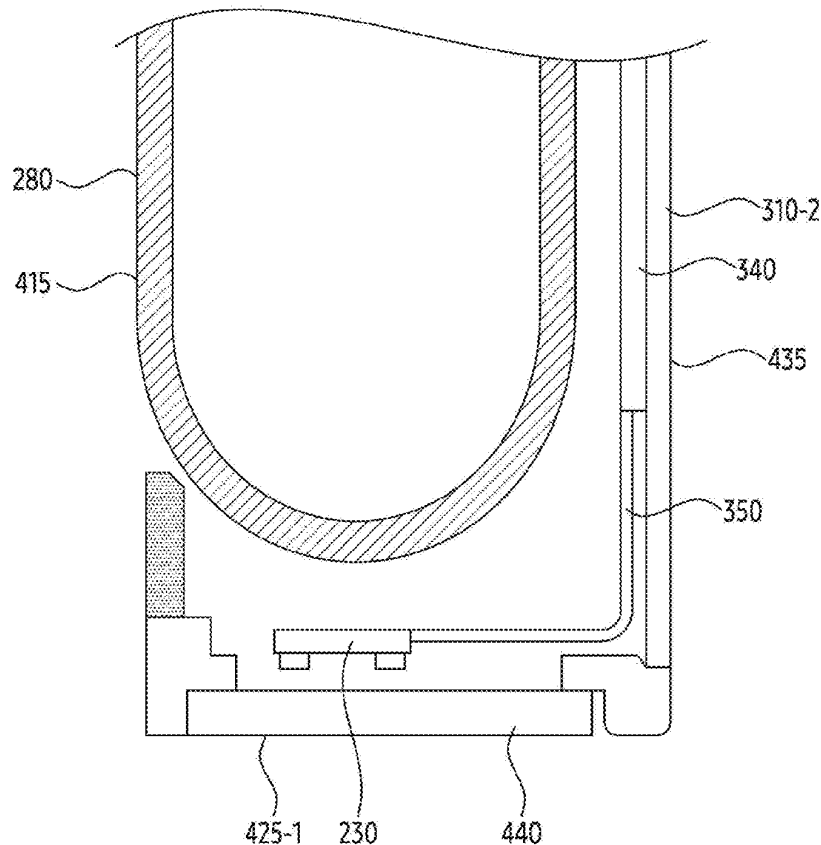
(63) Continuation of application No. PCT/KR2023/
003867, filed on Mar. 23, 2023.

(30) **Foreign Application Priority Data**

Mar. 24, 2022 (KR) 10-2022-0036952
Apr. 14, 2022 (KR) 10-2022-0046571

ABSTRACT

An electronic device according to an embodiment may comprise: a housing, including a first surface, a second surface facing the first surface at a distance, and a third surface disposed between the first surface and the second surface; at least one processor, comprising processing circuitry, disposed on the first surface of the housing; a communication circuit connected to at least one processor; and a printed circuit board (PCB) including an electronic component connected to at least one processor independently of the communication circuit and disposed on a surface thereof facing the third surface. The PCB can include a conductive pattern formed on the surface of the PCB facing the third surface and connected to a power supply line extending from the communication circuit. The PCB of the electronic device may be disposed to be adjacent to the third surface.





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(19) **United States**

(12) **Patent Application Publication**
Kuna et al.

(10) **Pub. No.: US 2025/0015484 A1**

(43) **Pub. Date: Jan. 9, 2025**

(54) **ELECTRONIC DEVICE HOUSING WITH
INTEGRATED ANTENNA**

(60) Provisional application No. 62/725,227, filed on Aug.
30, 2018.

(71) Applicant: **Apple Inc.**, Cupertino, CA (US)

Publication Classification

(72) Inventors: **Melody L. Kuna**, Palo Alto, CA (US);
Carlo Catalano, Capitola, CA (US);
Lee B. Hamstra, Mountain View, CA
(US); **Ross Errett**, Cupertino, CA (US);
Devin Williams, Cupertino, CA (US);
Florence W. Ow, Los Altos Hills, CA
(US); **Alex Chung Lap Yeung**, San
Francisco, CA (US); **Carli Oster**, San
Francisco, CA (US)

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
G06F 1/16 (2006.01)
G06F 3/044 (2006.01)
H01Q 1/22 (2006.01)
(52) **U.S. Cl.**
CPC **H01Q 1/243** (2013.01); **G06F 1/1626**
(2013.01); **G06F 1/1656** (2013.01); **G06F**
3/044 (2013.01); **H01Q 1/2258** (2013.01)

(21) Appl. No.: **18/893,934**

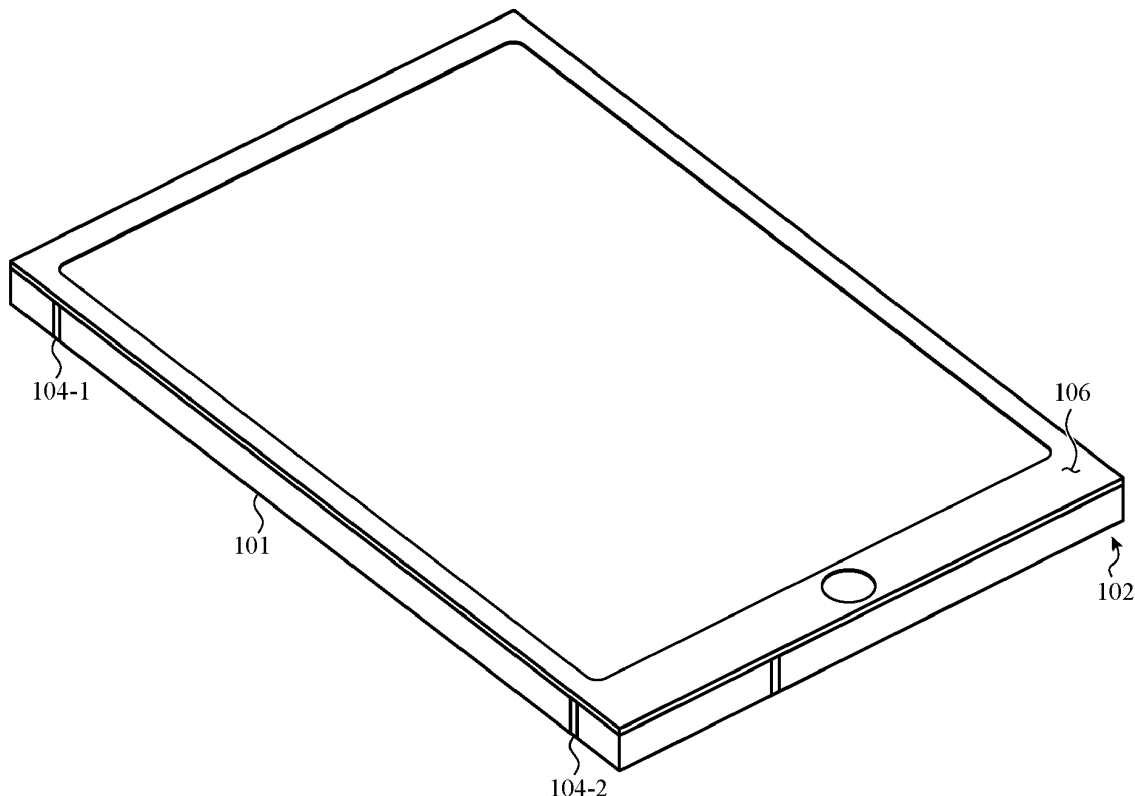
(57) **ABSTRACT**

(22) Filed: **Sep. 23, 2024**

Related U.S. Application Data

(63) Continuation of application No. 18/212,134, filed on
Jun. 20, 2023, now Pat. No. 12,142,819, which is a
continuation of application No. 17/848,214, filed on
Jun. 23, 2022, now Pat. No. 11,720,149, which is a
continuation of application No. 16/903,110, filed on
Jun. 16, 2020, now Pat. No. 11,379,010, which is a
continuation of application No. 16/183,591, filed on
Nov. 7, 2018, now Pat. No. 10,705,570.

An electronic device may include a display, a housing
member at least partially surrounding the display and includ-
ing a first segment defining a first portion of an exterior
surface of the electronic device, a second segment defining
a second portion of the exterior surface of the electronic
device and configured to function as an antenna, and a
bridge segment structurally and conductively coupling the
first segment to the second segment. The electronic device
may also include a molded element positioned between the
first segment and the second segment and defining a third
portion of the exterior surface of the electronic device.





US 20250015490A1

(19) **United States**(12) **Patent Application Publication**
Li et al.(10) **Pub. No.: US 2025/0015490 A1**(43) **Pub. Date: Jan. 9, 2025**(54) **ANTENNA ASSEMBLY AND ELECTRONIC
DEVICE****Publication Classification**

(51) **Int. Cl.**
H01Q 1/52 (2006.01)
H01Q 1/22 (2006.01)
H01Q 1/48 (2006.01)
(52) **U.S. Cl.**
CPC **H01Q 1/521** (2013.01); **H01Q 1/22**
(2013.01); **H01Q 1/48** (2013.01)

(71) Applicant: **Huawei Technologies Co., Ltd.**,
Shenzhen (CN)(72) Inventors: **Zongze Li**, Shanghai (CN); **Yanbo Li**,
Wuhan (CN); **Wenjun Chen**, Wuhan
(CN); **Jun You**, Wuhan (CN); **Kemeng
Wang**, Dongguan (CN)(21) Appl. No.: **18/713,372**(22) PCT Filed: **May 13, 2022**(86) PCT No.: **PCT/CN2022/092826**

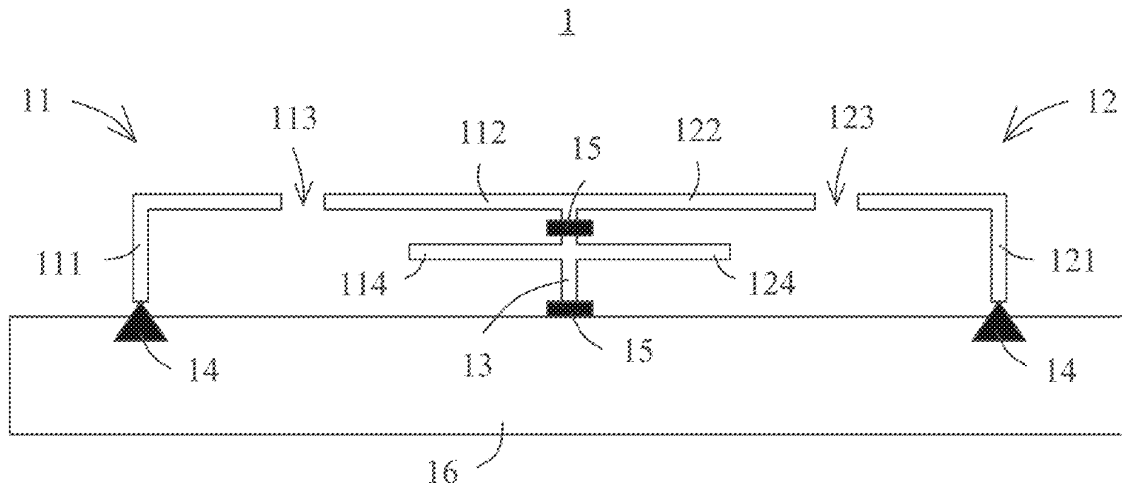
§ 371 (c)(1),

(2) Date: **May 24, 2024**(30) **Foreign Application Priority Data**

Dec. 6, 2021 (CN) 202123040809.1

ABSTRACT

An antenna assembly includes a first radiator, a second radiator, a feeding structure, and a decoupling apparatus. The first radiator includes a first radiation branch and a second radiation branch that have opposite bending directions, and a first gap exists between the first radiation branch and the second radiation branch. The second radiator includes a third radiation branch and a fourth radiation branch that have opposite bending directions, and a second gap exists between the third radiation branch and the fourth radiation branch. The feeding structure is electrically coupled to the first radiation branch and the third radiation branch. The first radiator and the second radiator share a common part, the common part is a common branch, and the common branch is electrically coupled to a grounding terminal of the antenna assembly through the decoupling apparatus.





US 20250016940A1

(19) **United States**

(12) **Patent Application Publication**
KIM et al.

(10) **Pub. No.: US 2025/0016940 A1**

(43) **Pub. Date: Jan. 9, 2025**

(54) **ANTENNA STRUCTURE AND ELECTRONIC
DEVICE INCLUDING SAME**

Publication Classification

(71) Applicant: **SAMSUNG ELECTRONICS CO.,
LTD.**, Suwon-si (KR)

(51) **Int. Cl.**
H05K 5/02 (2006.01)
H01Q 1/24 (2006.01)
H05K 5/03 (2006.01)
H05K 7/14 (2006.01)

(72) Inventors: **Hyunsuk KIM**, Suwon-si (KR); **Hojin
JUNG**, Suwon-si (KR); **Wonho LEE**,
Suwon-si (KR); **Joongyeon CHO**,
Suwon-si (KR); **Junghyeob LEE**,
Suwon-si (KR); **Hyunju HONG**,
Suwon-si (KR)

(52) **U.S. Cl.**
CPC **H05K 5/0217** (2013.01); **H01Q 1/243**
(2013.01); **H05K 5/03** (2013.01); **H05K**
7/1427 (2013.01)

(21) Appl. No.: **18/888,057**

(22) Filed: **Sep. 17, 2024**

Related U.S. Application Data

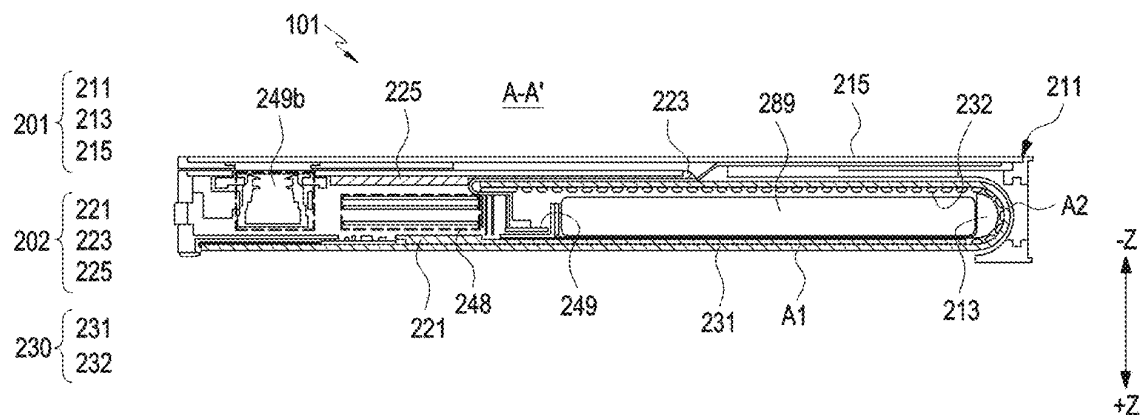
(63) Continuation of application No. PCT/KR2023/
002549, filed on Feb. 22, 2023.

(30) **Foreign Application Priority Data**

Mar. 22, 2022 (KR) 10-2022-0035575
Aug. 2, 2022 (KR) 10-2022-0096232

ABSTRACT

An electronic device includes: a first housing; a second housing configured to slide with respect to the first housing; a rollable display including a first display area and a second display area extending from the first display area and including a bending portion which is bent, and configured such that at least a part of the second display area moves on the basis of the sliding of the second housing; and a circuit board disposed in the first housing and including a communication circuit configured to process an RF signal, where a lower end wall of the first housing includes: a non-metal area in which at least a part of the non-metal area faces the bending portion as a non-metal area spaced a designated distance apart from the bending portion; and at least one metal sheet disposed to cover at least a part of the non-metal area.





US 20250016947A1

(19) **United States**

(12) **Patent Application Publication**
PARK et al.

(10) **Pub. No.: US 2025/0016947 A1**

(43) **Pub. Date: Jan. 9, 2025**

(54) **ELECTRONIC DEVICE INCLUDING
ANTENNA STRUCTURE USING HOUSING**

H05K 1/02 (2006.01)

H05K 1/14 (2006.01)

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

(52) **U.S. Cl.**

CPC *H05K 7/1427* (2013.01); *H04M 1/0235*
(2013.01); *H04M 1/0268* (2013.01); *H04M*
1/0277 (2013.01); *H05K 1/0277* (2013.01);
H05K 1/14 (2013.01)

(72) Inventors: **Sungkoo PARK**, Suwon-si (KR);
Mincheol SEO, Suwon-si (KR);
Soonho HWANG, Suwon-si (KR)

(21) Appl. No.: **18/893,601**

(22) Filed: **Sep. 23, 2024**

Related U.S. Application Data

(63) Continuation of application No. PCT/KR2023/
003871, filed on Mar. 23, 2023.

(30) **Foreign Application Priority Data**

Mar. 24, 2022 (KR) 10-2022-0036953

May 2, 2022 (KR) 10-2022-0054482

Publication Classification

(51) **Int. Cl.**

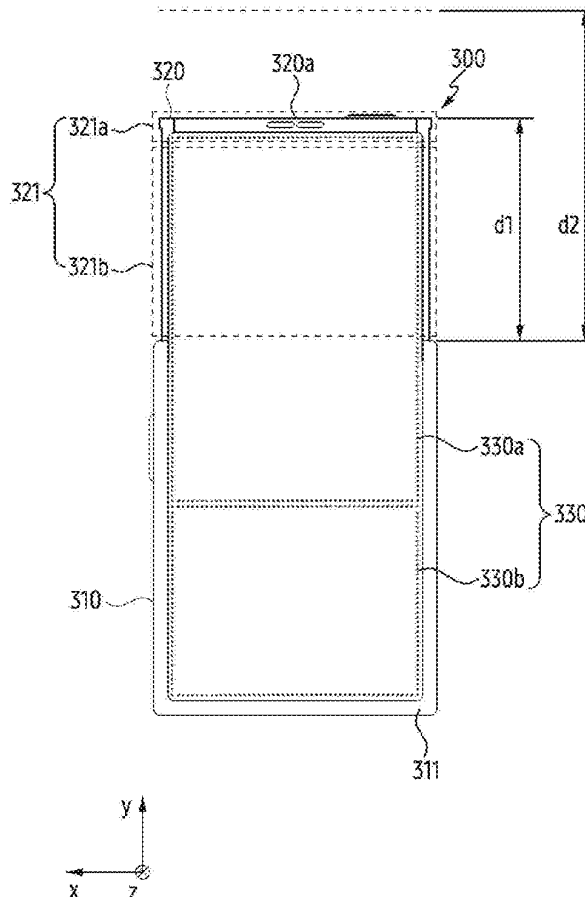
H05K 7/14 (2006.01)

H04M 1/02 (2006.01)

(57)

ABSTRACT

An electronic device according to an embodiment comprises: an inner housing; an outer housing coupled to the inner housing such that the inner housing is configured to move along a first direction or a second direction opposite to the first direction, and includes an opening formed in a portion of a surface that faces the second direction and connected to a space formed by the coupling of the outer housing and the inner housing; a side member comprising a conductive material and including at least one conductive portion which forms at least a portion of the side surface of the outer housing facing the second direction; and a wireless communication circuit operatively connected to the at least one conductive portion, wherein the wireless communication circuit can be configured to communicate with an external electronic device in a designated frequency band through the at least one conductive portion.





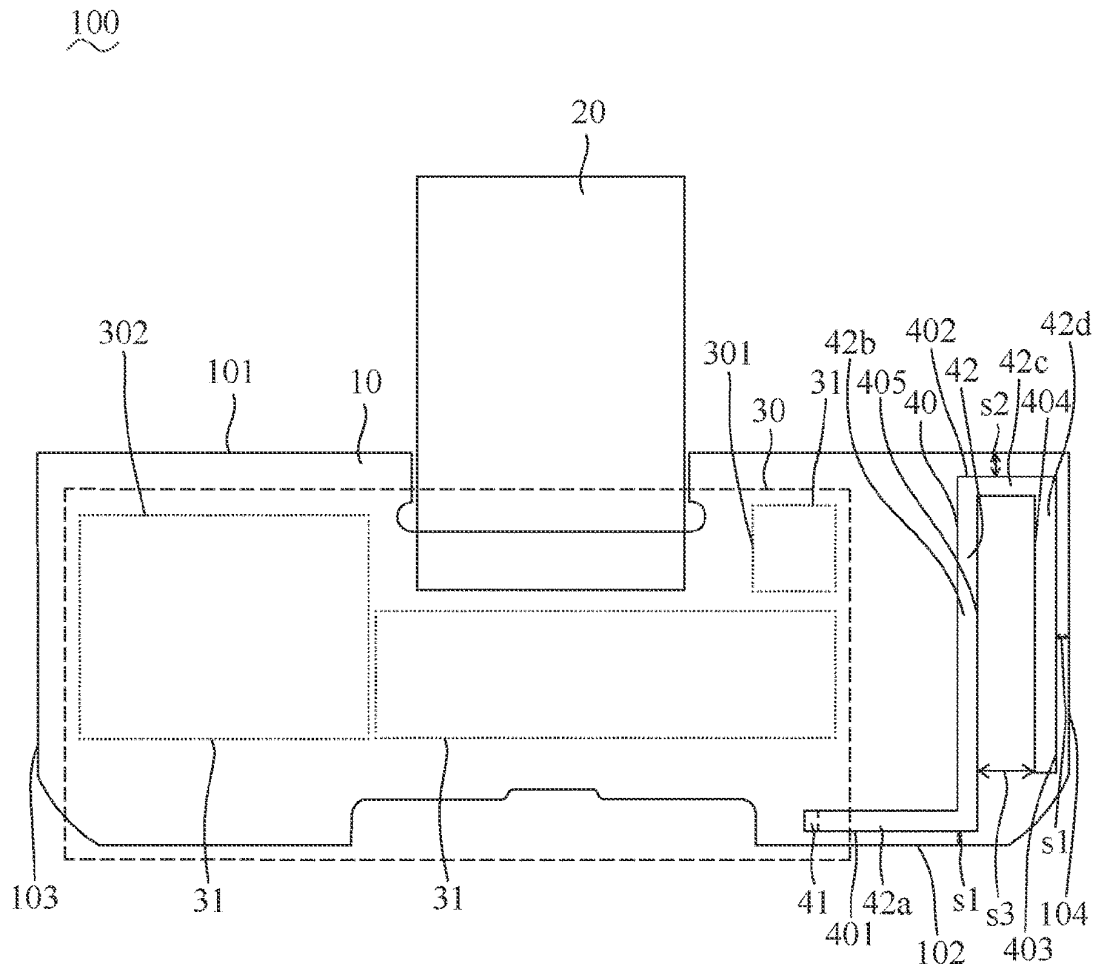
US 20250007144A1

(19) **United States**(12) **Patent Application Publication**
HSIAO et al.(10) **Pub. No.: US 2025/0007144 A1**(43) **Pub. Date: Jan. 2, 2025**(54) **WIRELESS DONGLE**(71) Applicant: **CHENG UEI PRECISION**
INDUSTRY CO., LTD., New Taipei
City (TW)(72) Inventors: **LAN-YUNG HSIAO**, New Taipei City
(TW); **PING-CHUN LU**, New Taipei
City (TW); **SHAO-KAI SUN**, New
Taipei City (TW)(21) Appl. No.: **18/608,897**(22) Filed: **Mar. 18, 2024**(30) **Foreign Application Priority Data**

May 15, 2023 (CN) 202321160391.4

Publication Classification(51) **Int. Cl.**
H01Q 1/22 (2006.01)
H01Q 1/50 (2006.01)
H01Q 9/04 (2006.01)(52) **U.S. Cl.**CPC **H01Q 1/22** (2013.01); **H01Q 1/50**
(2013.01); **H01Q 9/0407** (2013.01)(57) **ABSTRACT**

A wireless dongle includes a circuit board, a connector, a wireless module and a printed antenna. The circuit board has a first front edge, a first rear edge, a first left edge and a first right edge. The connector is disposed to a middle of a front of the circuit board. The wireless module is disposed to a middle area and a left area of the circuit board. The connector is electrically connected to the wireless module. The printed antenna is positioned at a right area of the circuit board. The printed antenna is a monopole antenna. The wireless module is connected between the connector and the printed antenna. The printed antenna has a feed-in section positioned close to the first rear edge of the circuit board, and a radiation section.





US 20250007161A1

(19) **United States**

(12) **Patent Application Publication**
Wu et al.

(10) **Pub. No.: US 2025/0007161 A1**

(43) **Pub. Date: Jan. 2, 2025**

(54) **ANTENNA AND ELECTRONIC DEVICE**

Publication Classification

(71) Applicant: **Huawei Technologies Co., Ltd.**,
Shenzhen (CN)

(51) **Int. Cl.**
H01Q 5/328 (2006.01)
H01Q 1/24 (2006.01)
H01Q 1/44 (2006.01)
H01Q 1/48 (2006.01)

(72) Inventors: **Pengfei Wu**, Shanghai (CN); **Hanyang Wang**, Reading (GB); **Liang Xue**,
Shanghai (CN); **Meng Hou**, Shanghai
(CN)

(52) **U.S. Cl.**
CPC **H01Q 5/328** (2015.01); **H01Q 1/243**
(2013.01); **H01Q 1/44** (2013.01); **H01Q 1/48**
(2013.01)

(21) Appl. No.: **18/708,741**

(22) PCT Filed: **Oct. 26, 2022**

(57) **ABSTRACT**

(86) PCT No.: **PCT/CN2022/127675**

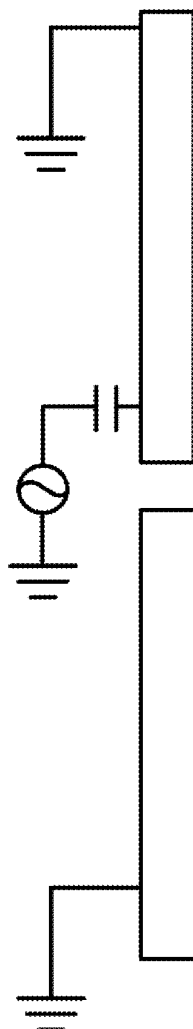
§ 371 (c)(1),

(2) Date: **May 9, 2024**

In accordance with an embodiment, an antenna includes at least two radiators. The at least two radiators include a first radiator and a second radiator that are spaced apart in parallel, and a first end of the first radiator is disposed closer to a first end of the second radiator than a second end of the first radiator. Both the first radiator and the second radiator are connected to a feed point.

(30) **Foreign Application Priority Data**

Nov. 11, 2021 (CN) 202111332957.2





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(19) **United States**

(12) **Patent Application Publication**
Hanninen et al.

(10) **Pub. No.: US 2025/0007167 A1**

(43) **Pub. Date: Jan. 2, 2025**

(54) **DUAL BAND LOOP AND INVERTED-F
GROUND EDGE RADIATING ANTENNA
STRUCTURE**

(52) **U.S. Cl.**
CPC **H01Q 9/0414** (2013.01); **H01Q 5/49**
(2015.01); **H01Q 9/30** (2013.01)

(71) Applicant: **Silicon Laboratories Inc.**, Austin, TX
(US)

(57) **ABSTRACT**

(72) Inventors: **Tuomas Hanninen**, Helsinki (FI);
Attila Zolomy, Budapest (HU)

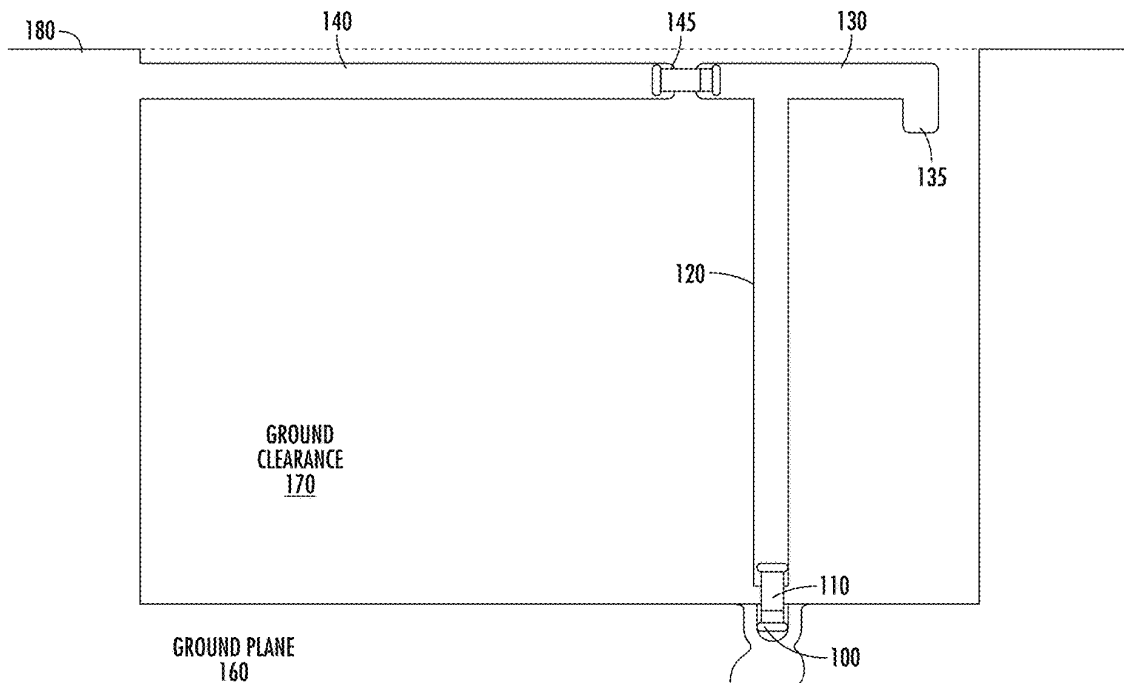
(21) Appl. No.: **18/215,288**

(22) Filed: **Jun. 28, 2023**

Publication Classification

(51) **Int. Cl.**
H01Q 9/04 (2006.01)
H01Q 5/49 (2006.01)
H01Q 9/30 (2006.01)

A dual band antenna structure is disclosed. The dual band antenna structure utilizes features from loop ground edge radiating antennas and inverted-F antennas to create an antenna that has two resonance frequencies. The dual band antenna structure includes a loop ground edge radiating antenna, which has a first resonance frequency. A monopole branch is also located at the end of the feeding trace to provide a second resonance frequency. The dual band antenna structure is useful for network devices that operate at multiple frequencies, such as those using the WiFi/BLE/IEEE802.15.4 protocols.





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(19) **United States**(12) **Patent Application Publication**
LEE et al.(10) **Pub. No.: US 2024/0429618 A1**(43) **Pub. Date: Dec. 26, 2024**(54) **ANTENNA STRUCTURE AND ELECTRONIC
DEVICE INCLUDING THE SAME****Publication Classification**

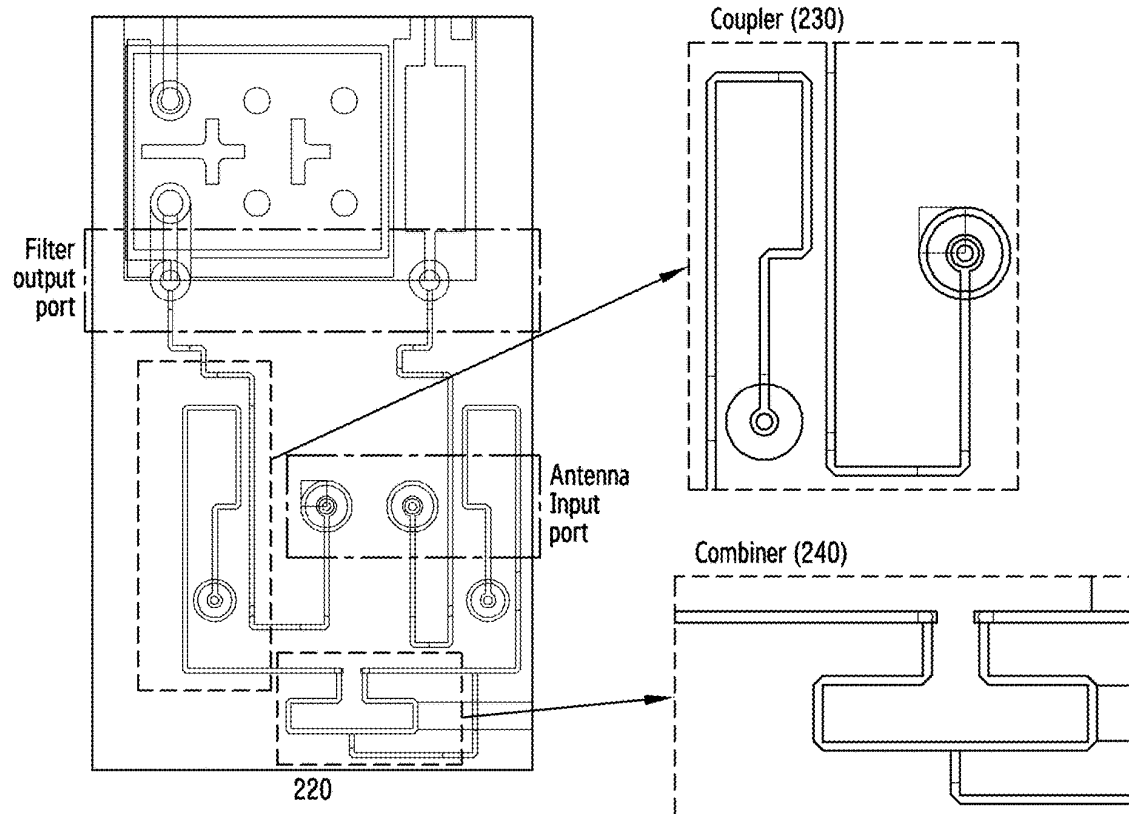
(51) **Int. Cl.**
H01Q 21/00 (2006.01)
H01Q 1/24 (2006.01)
(52) **U.S. Cl.**
CPC *H01Q 21/0006* (2013.01); *H01Q 1/246*
(2013.01)

(71) Applicant: **Samsung Electronics Co., Ltd.**,
Suwon-si (KR)(72) Inventors: **Bumhee LEE**, Suwon-si (KR);
Seungtae KO, Suwon-si (KR); **Junsig
KUM**, Suwon-si (KR); **Youngeon KIM**,
Suwon-si (KR); **Seokmin LEE**,
Suwon-si (KR); **Youngju LEE**,
Suwon-si (KR); **Jongmin LEE**,
Suwon-si (KR); **Seungho CHOI**,
Suwon-si (KR)(21) Appl. No.: **18/819,279**(22) Filed: **Aug. 29, 2024****Related U.S. Application Data**(63) Continuation of application No. 18/075,850, filed on
Dec. 6, 2022, now Pat. No. 12,107,334, which is a
continuation of application No. PCT/KR2022/
014957, filed on Oct. 5, 2022.(30) **Foreign Application Priority Data**

Oct. 8, 2021 (KR) 10-2021-0134343

(57) **ABSTRACT**

The disclosure relates to a fifth generation (5G) or pre-5G communication system supporting higher data rates after a fourth generation (4G) communication system such as Long Term Evolution (LTE). A module in a wireless communication system is provided. The module includes a plurality of antenna elements, an antenna substrate coupled to the plurality of antenna elements, a metal plate coupled to the antenna substrate, a calibration substrate coupled to a Radio Frequency (RF) component on a first face, and a conductive adhesive material for electrical coupling between the metal plate and the calibration substrate. The conductive adhesive material may be coupled to the calibration substrate on a second face different from the first face of the calibration substrate. The conductive adhesive material may include an air gap formed along a signal line included in the calibration substrate.





US 20240429628A1

(19) **United States**

(12) **Patent Application Publication**
Hassan et al.

(10) **Pub. No.: US 2024/0429628 A1**

(43) **Pub. Date: Dec. 26, 2024**

(54) **SINGLE PORT ORTHOGONALLY POLARIZED ANTENNAS FOR HANDSETS, IOT TERMINALS, AND VEHICLES**

(71) Applicants: **Noha Hassan**, Cairo (EG); **Mohamed Sanad**, Reno, NV (US)

(72) Inventors: **Noha Hassan**, Cairo (EG); **Mohamed Sanad**, Reno, NV (US)

(21) Appl. No.: **18/823,665**

(22) Filed: **Sep. 3, 2024**

Publication Classification

(51) **Int. Cl.**
H01Q 21/28 (2006.01)
H01Q 1/24 (2006.01)
H01Q 1/32 (2006.01)
H01Q 5/357 (2006.01)
H04B 7/0413 (2006.01)

(52) **U.S. Cl.**
CPC **H01Q 21/28** (2013.01); **H01Q 1/243** (2013.01); **H01Q 1/3291** (2013.01); **H01Q 5/357** (2015.01); **H04B 7/0413** (2013.01)

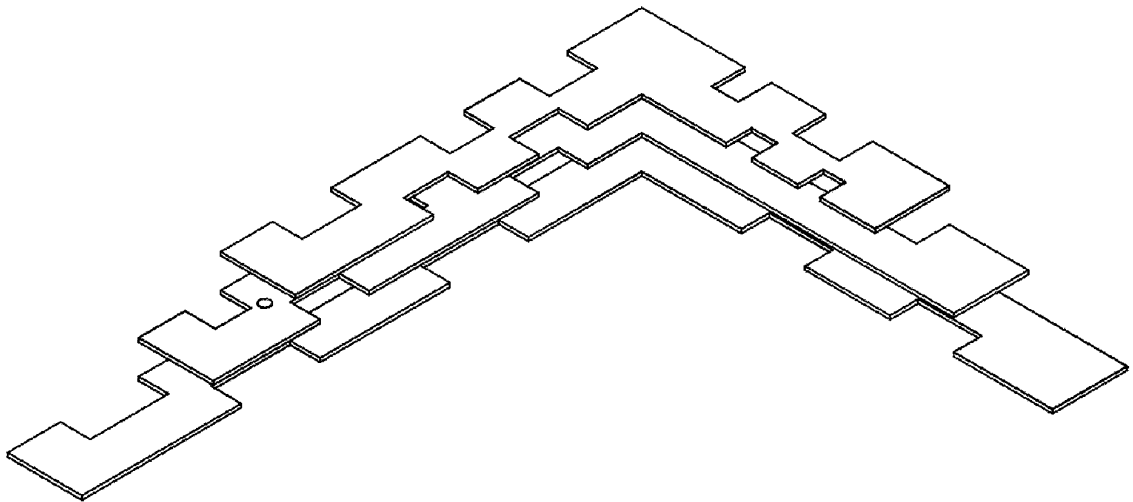
Related U.S. Application Data

(63) Continuation of application No. 17/808,522, filed on Jun. 23, 2022, now Pat. No. 12,080,949, which is a continuation-in-part of application No. 17/655,172, filed on Mar. 16, 2022, now abandoned.

(60) Provisional application No. 63/161,676, filed on Mar. 16, 2021.

(57) **ABSTRACT**

A single port orthogonally terminal polarized antenna is disclosed herein. The antenna may be used in apparatuses including but not limited to handsets, Internet of Things (IoT) terminals, and vehicles. The antenna significantly reduces the need for spatial diversity multiple-in and multiple-out (MIMO) in terminals.





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(19) **United States**

(12) **Patent Application Publication**
Hu et al.

(10) **Pub. No.: US 2025/0023238 A1**

(43) **Pub. Date: Jan. 16, 2025**

(54) **TERMINAL ANTENNA AND ELECTRONIC
DEVICE**

H01Q 7/00 (2006.01)

H01Q 9/04 (2006.01)

H01Q 13/10 (2006.01)

(71) Applicant: **Honor Device Co., Ltd.**, Shenzhen
(CN)

(52) **U.S. Cl.**

CPC *H01Q 5/321* (2015.01); *H01Q 1/242*

(2013.01); *H01Q 7/005* (2013.01); *H01Q*

9/0421 (2013.01); *H01Q 13/10* (2013.01)

(72) Inventors: **Yiwu Hu**, Shenzhen (CN); **Aofang
Zhang**, Shenzhen (CN); **Shaojie Chu**,
Shenzhen (CN); **Kunpeng Wei**,
Shenzhen (CN)

(57)

ABSTRACT

(21) Appl. No.: **18/562,612**

(22) PCT Filed: **Apr. 26, 2023**

(86) PCT No.: **PCT/CN2023/091004**

§ 371 (c)(1),

(2) Date: **Nov. 20, 2023**

(30) **Foreign Application Priority Data**

Jun. 9, 2022 (CN) 202210648306.2

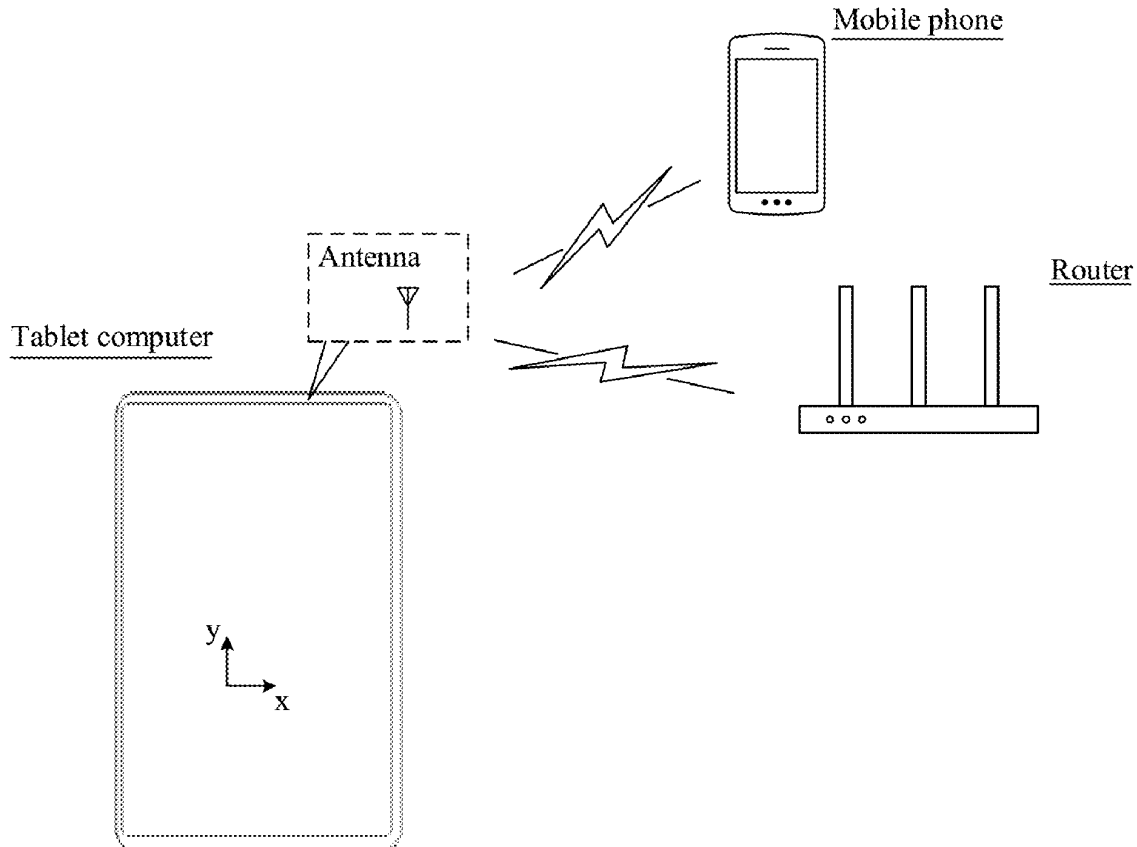
Publication Classification

(51) **Int. Cl.**

H01Q 5/321 (2006.01)

H01Q 1/24 (2006.01)

A terminal antenna and an electronic device, which relate to the field of antenna technologies. By adding a choke structure, optimization of a maximum gain of an original antenna is implemented, and in addition. A specific solution is as follows: the terminal antenna includes a first radiator and a second radiator. a first end of the first radiator is provided with a feed, and a second end of the first radiator is connected to a reference ground; the first radiator is provided with a gap that runs through the first radiator, the gap is in an interdigitated structure, and there are at least two gaps; and the second radiator is arranged on a side of the first radiator, the second radiator is L-shaped, the second radiator and the reference ground enclose an inverted L-shaped first gap.

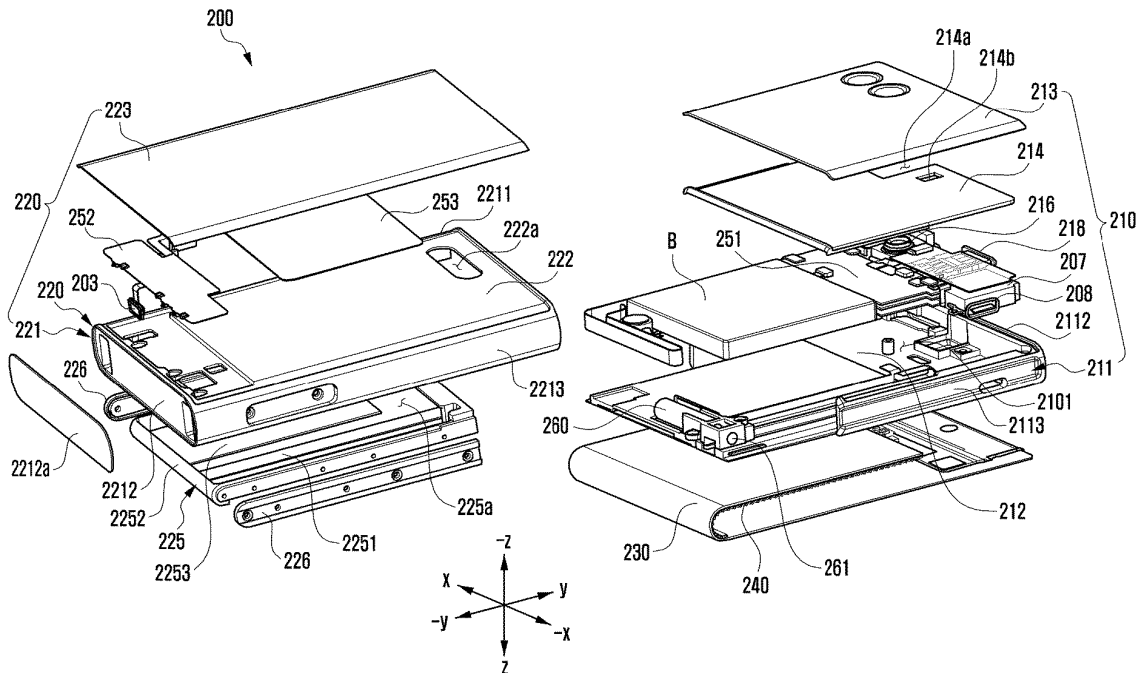




US 20250023969A1

(19) **United States**(12) **Patent Application Publication**
SEOL et al.(10) **Pub. No.: US 2025/0023969 A1**(43) **Pub. Date: Jan. 16, 2025**(54) **ELECTRONIC APPARATUS INCLUDING ANTENNA**(71) Applicant: **Samsung Electronics Co., Ltd.**,
Suwon-si (KR)(72) Inventors: **Kyungmoon SEOL**, Suwon-si (KR);
Yoonjung KIM, Suwon-si (KR); **Jiho KIM**,
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Minkyung LEE, Suwon-si (KR); **Kyihyun JANG**,
Suwon-si (KR); **Hochul HWANG**, Suwon-si (KR)(21) Appl. No.: **18/899,352**(22) Filed: **Sep. 27, 2024****Related U.S. Application Data**(63) Continuation of application No. PCT/KR2023/
003945, filed on Mar. 24, 2023.(30) **Foreign Application Priority Data**Mar. 28, 2022 (KR) 10-2022-0038406
May 17, 2022 (KR) 10-2022-0060015**Publication Classification**(51) **Int. Cl.**
H04M 1/02 (2006.01)
H01Q 1/24 (2006.01)
H01Q 1/52 (2006.01)(52) **U.S. Cl.**
CPC **H04M 1/0268** (2013.01); **H01Q 1/243**
(2013.01); **H01Q 1/526** (2013.01); **H04M**
1/0235 (2013.01)(57) **ABSTRACT**

An electronic device is provided. The electronic device includes a first housing including a first space, a second housing slidably coupled to the first housing and including a second space, a flexible display disposed to be supported by the first housing and the second housing, and having a display area that partially changes when the flexible display is converted from a slide-in state to a slide-out state, a first substrate disposed in the first space of the first housing, a second substrate disposed on a first surface of the second housing and including a first antenna pattern, a wireless communication circuit disposed on one of the first substrate or the second substrate and electrically connected to the first antenna pattern, and a hole formed in a portion of the second housing, wherein the first antenna pattern is disposed to overlap the hole.

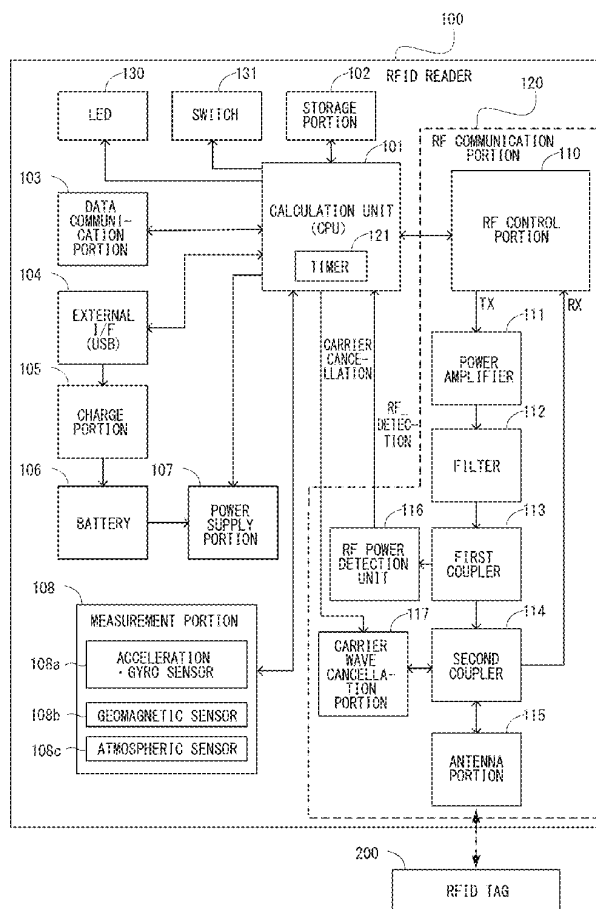




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(19) **United States**(12) **Patent Application Publication**
MUROFUSHI et al.(10) **Pub. No.: US 2024/0428041 A1**(43) **Pub. Date: Dec. 26, 2024**(54) **READING DEVICE**(71) Applicant: **CANON KABUSHIKI KAISHA,**
Tokyo (JP)(72) Inventors: **MITSUHIDE MUROFUSHI,**
Shizuoka (JP); **KENICHI NAKAO,**
Shizuoka (JP)(21) Appl. No.: **18/822,767**(22) Filed: **Sep. 3, 2024****Related U.S. Application Data**(63) Continuation of application No. PCT/JP2023/
001360, filed on Jan. 18, 2023.(30) **Foreign Application Priority Data**Mar. 17, 2022 (JP) 2022-042058
Apr. 18, 2022 (JP) 2022-068066**Publication Classification**(51) **Int. Cl.**
G06K 19/077 (2006.01)
G06K 19/07 (2006.01)(52) **U.S. Cl.**CPC ... **G06K 19/07773** (2013.01); **G06K 19/0702**
(2013.01); **G06K 19/0723** (2013.01)(57) **ABSTRACT**

A reading device includes an antenna element, a substrate including a communication circuit and a ground plane, a connecting member protruding from the substrate in a thickness direction of the substrate and configured to electrically connect the communication circuit and the antenna element, and a casing configured to retain the antenna element, the substrate, and the connecting member. The antenna element is arranged separately from the substrate toward one side in the thickness direction. The casing includes a first surface portion that covers the substrate when viewed from the other side in the thickness direction. In a case where a distance in the thickness direction from a feed point to the ground plane is a first distance, and a distance in the thickness direction between the substrate and the first surface portion is a second distance, the first distance is greater than the second distance.





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(19) **United States**

(12) **Patent Application Publication**
TEZUKA

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(43) **Pub. Date: Dec. 26, 2024**

(54) **TRANSMISSION LINE, ANTENNA, AND
DISPLAY DEVICE**

Publication Classification

(51) **Int. Cl.**
H01P 3/02 (2006.01)
H01Q 9/04 (2006.01)

(52) **U.S. Cl.**
CPC **H01P 3/02** (2013.01); **H01Q 9/0407**
(2013.01)

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(72) Inventor: **Kenichi TEZUKA**, Tokyo (JP)

(73) Assignee: **TDK Corporation**, Tokyo (JP)

(21) Appl. No.: **18/826,240**

(22) Filed: **Sep. 6, 2024**

Related U.S. Application Data

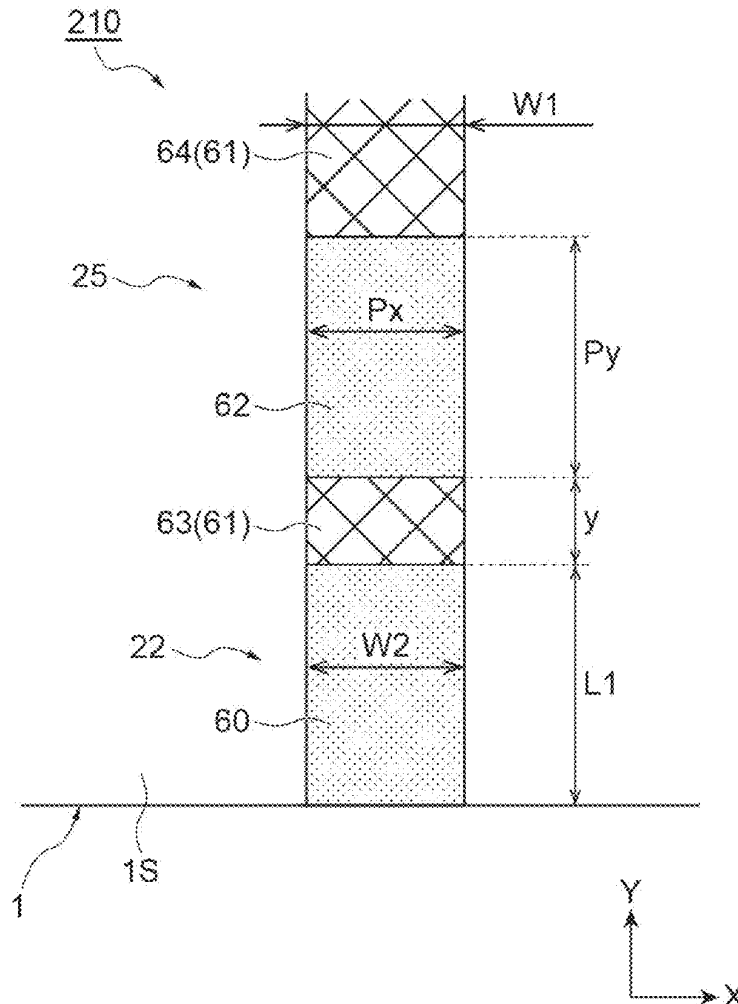
(63) Continuation of application No. PCT/JP2023/
008910, filed on Mar. 8, 2023.

(30) **Foreign Application Priority Data**

Mar. 10, 2022 (JP) 2022-036867

(57) **ABSTRACT**

A transmission line includes a line portion extending in a first direction on one main surface side of a dielectric, and a terminal portion connected to an end part of the line portion, in which the line portion includes an opening conductor portion having a conductor pattern including an opening, and a planar conductor portion configured to be electrically connected to the opening conductor portion and to have a conductor extending so as to form a planar surface, the planar conductor portion is disposed apart from the terminal portion in the first direction, and the planar conductor portion has a length in the first direction greater than or equal to a length of the planar conductor portion in a second direction orthogonal to the first direction.





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(19) **United States**

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ABDULHADI

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(54) **ANTENNAS, RELATED DEVICES AND METHODS**

Publication Classification

(71) Applicant: **SKYWORKS SOLUTIONS, INC.**,
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(51) **Int. Cl.**
H01Q 1/22 (2006.01)
H01Q 9/04 (2006.01)

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(52) **U.S. Cl.**
CPC **H01Q 1/22** (2013.01); **H01Q 9/0407**
(2013.01)

(21) Appl. No.: **18/596,910**

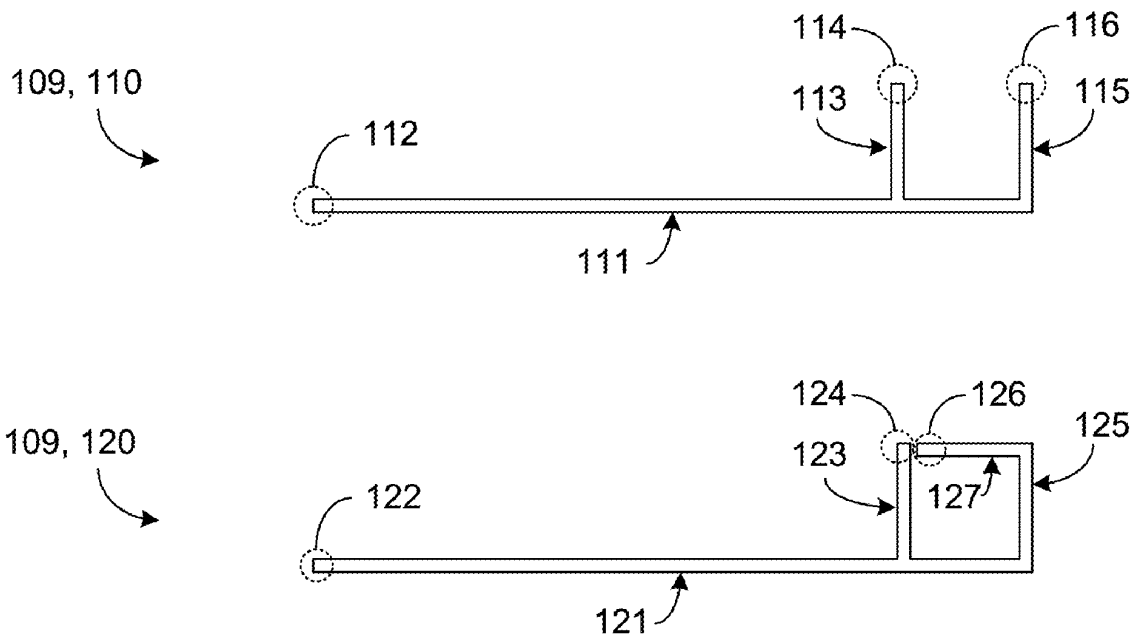
(57) **ABSTRACT**

(22) Filed: **Mar. 6, 2024**

Related U.S. Application Data

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In some embodiments, an antenna device can include a substrate, a ground plane, and first and second antenna elements each having a shape selected from an F-shape and a P-shape. Each antenna element can include a feed point connectable to an antenna circuit and a grounding point electrically connected to the ground plane.





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KIM et al.

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(43) **Pub. Date: Dec. 26, 2024**

(54) **ELECTRONIC DEVICE COMPRISING
ANTENNA AND SEGMENT STRUCTURE**

Publication Classification

(71) Applicant: **Samsung Electronics Co., Ltd.**,
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(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 9/04 (2006.01)
H01Q 21/08 (2006.01)

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LI, Suwon-si (KR); **Minseok PARK**,
Suwon-si (KR)

(52) **U.S. Cl.**
CPC **H01Q 1/243** (2013.01); **H01Q 9/0407**
(2013.01); **H01Q 21/08** (2013.01)

(57) **ABSTRACT**

An electronic device is provided. The electronic device includes a housing including a first surface facing a front side of the electronic device, a second surface opposite to the first surface, and a peripheral part surrounding a space between the first surface and the second surface and including a conductive portion and a first non-conductive portion contacted with an end portion of the conductive portion, and an antenna module including a substrate, in the housing, disposed in a direction parallel to a portion of the peripheral part and a plurality of antenna elements disposed on a surface of the substrate and spaced apart from each other in the direction, wherein, when the peripheral part is viewed vertically, the peripheral part includes a first region overlapping the antenna module and a second region including the conductive portion having a thickness greater than a thickness of the conductive portion included in the first region, and wherein, when the peripheral part is viewed vertically, the first non-conductive portion overlaps one of the plurality of antenna elements in the first region.

(21) Appl. No.: **18/822,869**

(22) Filed: **Sep. 3, 2024**

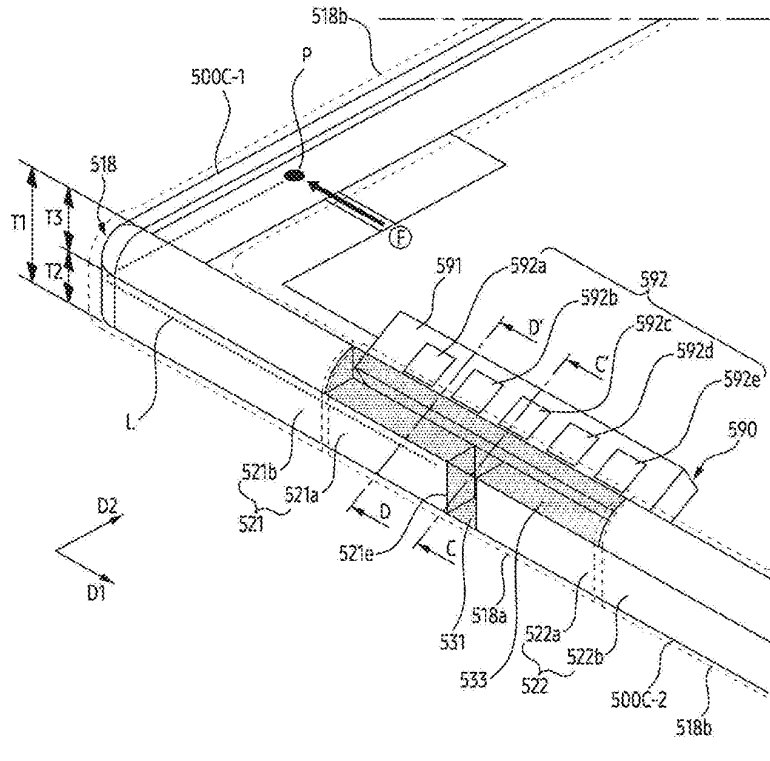
Related U.S. Application Data

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(30) **Foreign Application Priority Data**

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Apr. 11, 2022 (KR) 10-2022-0044844

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(19) **United States**

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FUJIMORI et al.

(10) **Pub. No.: US 2024/0431039 A1**

(43) **Pub. Date: Dec. 26, 2024**

(54) **INFORMATION PROCESSING DEVICE**

(71) Applicant: **NIDEC INSTRUMENTS CORPORATION**, Nagano (JP)

(72) Inventors: **Yuji FUJIMORI**, Nagano (JP); **Keiji OHTA**, Nagano (JP)

(21) Appl. No.: **18/747,449**

(22) Filed: **Jun. 19, 2024**

(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**
H05K 5/00 (2006.01)
H01Q 1/20 (2006.01)

(52) **U.S. Cl.**

CPC **H05K 5/0008** (2013.01); **H01Q 1/20** (2013.01); **H05K 5/0013** (2013.01)

(57)

ABSTRACT

An information processing device for performing communication with a medium in a non-contact manner includes a case having a first face part to which a medium is brought close, an antenna board which faces the first face part and includes an antenna for communicating with the medium, and a metal screw which is fastened to a screw hole formed in the case to fix the antenna board to the case. In an arrangement direction in which the first face part and the antenna board are arranged, when a side where the first face part is located is a first side, and a side where the antenna board is located is a second side, the screw is located on the second side with respect to the antenna board and, when viewed in a direction perpendicular to the arrangement direction, the screw is not overlapped with the antenna board.

