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(19) **United States**

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

(10) **Pub. No.: US 2026/0121276 A1**

(43) **Pub. Date: Apr. 30, 2026**

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

(71) Applicant: **Wistron NeWeb Corp.**, Hsinchu (TW)

(72) Inventors: **Guan-Hao LIAO**, Hsinchu (TW);
Chin-Tang HUANG, Hsinchu (TW);
Yen-Ming HONG, Hsinchu (TW)

(21) Appl. No.: **19/009,089**

(22) Filed: **Jan. 3, 2025**

(30) **Foreign Application Priority Data**

Jan. 24, 2024 (TW) 113102732

Publication Classification

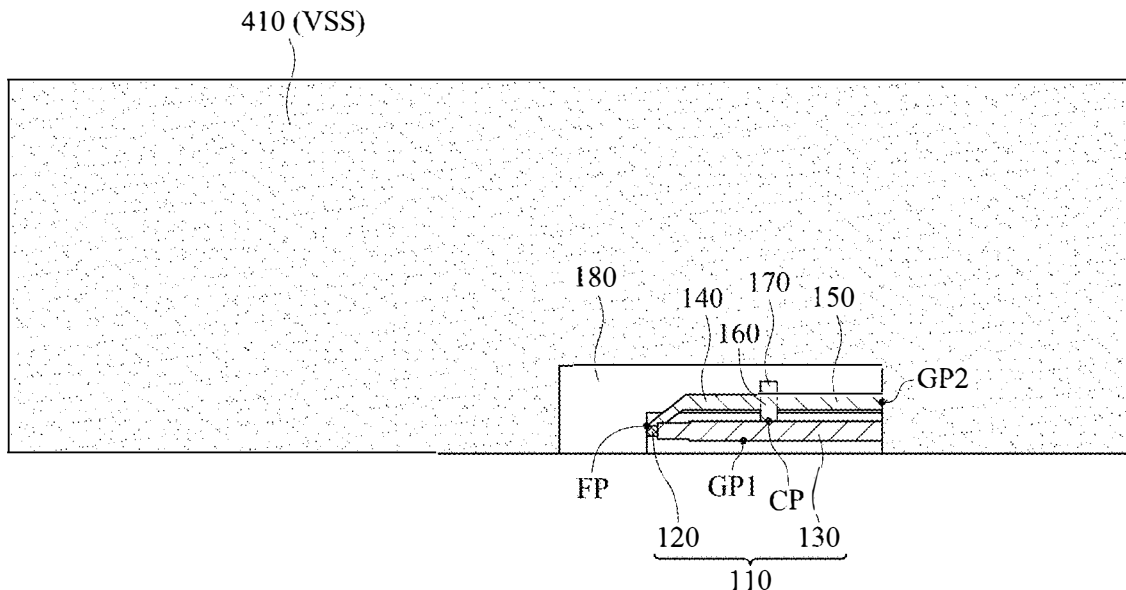
(51) **Int. Cl.**
H01Q 1/22 (2006.01)
H01Q 1/48 (2006.01)
H01Q 5/30 (2015.01)

(52) **U.S. Cl.**
CPC **H01Q 1/22** (2013.01); **H01Q 1/48**
(2013.01); **H01Q 5/30** (2015.01)

(57) **ABSTRACT**

An antenna structure includes a coaxial cable, a first radiation element, a second radiation element, a connection radiation element, a third radiation element, and a nonconductive support element. The coaxial cable includes a central conductor and a conductive housing. The central conductor is coupled to a feeding point. The conductive housing is coupled to a first grounding point. The first radiation element is coupled to the feeding point. The first radiation element is adjacent to the conductive housing. The second radiation element is coupled to a second grounding point. The second radiation element is adjacent to the conductive housing. The connection radiation element is coupled between the first radiation element and the second radiation element. The connection radiation element is also coupled to a connection point on the conductive housing. The third radiation element is coupled to the connection radiation element.

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US 20260121295 A1

(19) **United States**
(12) **Patent Application Publication**
TOYAO

(10) **Pub. No.:** **US 2026/0121295 A1**
(43) **Pub. Date:** **Apr. 30, 2026**

(54) **MULTI-RESONANT ANTENNA**

Publication Classification

(51) **Int. Cl.**

H01Q 5/307 (2015.01)

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

CPC **H01Q 5/307** (2015.01)

(71) Applicant: **Japan Aviation Electronics Industry, Limited, Tokyo (JP)**

(72) Inventor: **Hiroshi TOYAO, Tokyo (JP)**

(73) Assignee: **Japan Aviation Electronics Industry, Limited, Tokyo (JP)**

(21) Appl. No.: **19/318,519**

(22) Filed: **Sep. 4, 2025**

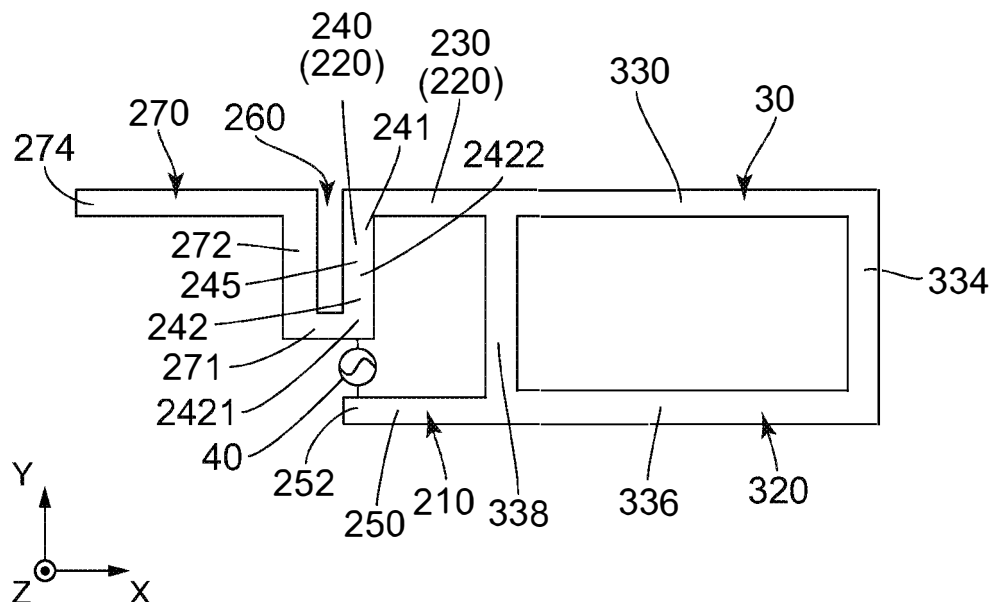
(30) **Foreign Application Priority Data**

Oct. 24, 2024 (JP) 2024-187252

ABSTRACT

A multi-resonant antenna comprises a main antenna and an additional radiation element. The main antenna comprises a main portion and a feeding portion. The main portion has a closed ring shape. The feeding portion has a first feeding part, a second feeding part, a first feeding point and a second feeding point. Each of the first feeding part and the second feeding part extends outward of the main antenna from the main portion. The first feeding point is provided at the first feeding part. The second feeding point is provided at the second feeding part. The additional radiation element extends outward of the main antenna directly from the first feeding part.

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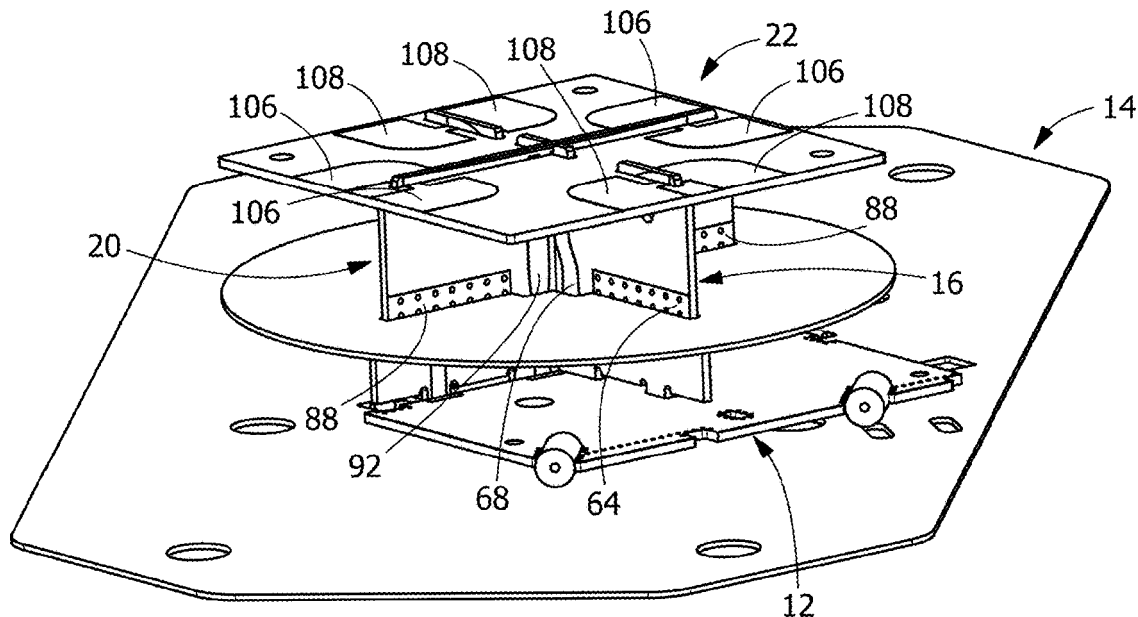
US 20260121297A1

(19) **United States**(12) **Patent Application Publication**
NG et al.(10) **Pub. No.: US 2026/0121297 A1**(43) **Pub. Date: Apr. 30, 2026**(54) **HIGH GAIN MULTIPLE INPUT, MULTIPLE
OUTPUT ANTENNA***H01Q 5/48* (2015.01)*H01Q 9/16* (2006.01)(71) Applicant: **TE Connectivity Solutions GmbH**,
Schaffhausen (CH)(52) **U.S. Cl.**CPC *H01Q 9/0414* (2013.01); *H01Q 1/48*
(2013.01); *H01Q 5/20* (2015.01); *H01Q 5/48*
(2015.01); *H01Q 9/16* (2013.01)(72) Inventors: **KokJiunn NG**, Penang (MY); **Rizwan
KHAN**, Penang (MY); **Jay Franklin
GILLETTE**, Middletown, PA (US);
Youngha CHOI, Middletown, PA (US)

(57)

ABSTRACT

A high gain multiple input, multiple output antenna which has a feeding board; a ground plane; a low band patch radiator; a first printed circuit board; a second printed circuit board; and a high band dipole patch radiator. The high band dipole patch radiator is a co-located stacked array on top of the low band patch radiator. The high band dipole patch radiator and the low band patch radiator are proximity coupled with the first printed circuit board and the second printed circuit board. The low band patch radiator covers low band frequencies in the range of 2.4 GHz to 2.5 GHz and the high band dipole patch radiator cover high band frequencies in the range of 4.9 GHz to 7.125 GHz. The antenna assembly has a gain of above 7.5 dBi and a well-directed radiation pattern with no side lobes.

(73) Assignee: **TE Connectivity Solutions GmbH**,
Schaffhausen (CH)(21) Appl. No.: **18/925,151**(22) Filed: **Oct. 24, 2024****Publication Classification**(51) **Int. Cl.***H01Q 9/04* (2006.01)*H01Q 1/48* (2006.01)*H01Q 5/20* (2015.01)



US 20260121303A1

(19) **United States**(12) **Patent Application Publication**
YOSHIKAWA(10) **Pub. No.: US 2026/0121303 A1**(43) **Pub. Date: Apr. 30, 2026**(54) **ANTENNA ELEMENT AND ARRAY
ANTENNA**(71) Applicant: **KYOCERA CORPORATION**,
Kyoto-shi, Kyoto (JP)(72) Inventor: **Hiromichi YOSHIKAWA**,
Yokohama-shi, Kanagawa (JP)(21) Appl. No.: **18/835,352**(22) PCT Filed: **Feb. 1, 2023**(86) PCT No.: **PCT/JP2023/003240**

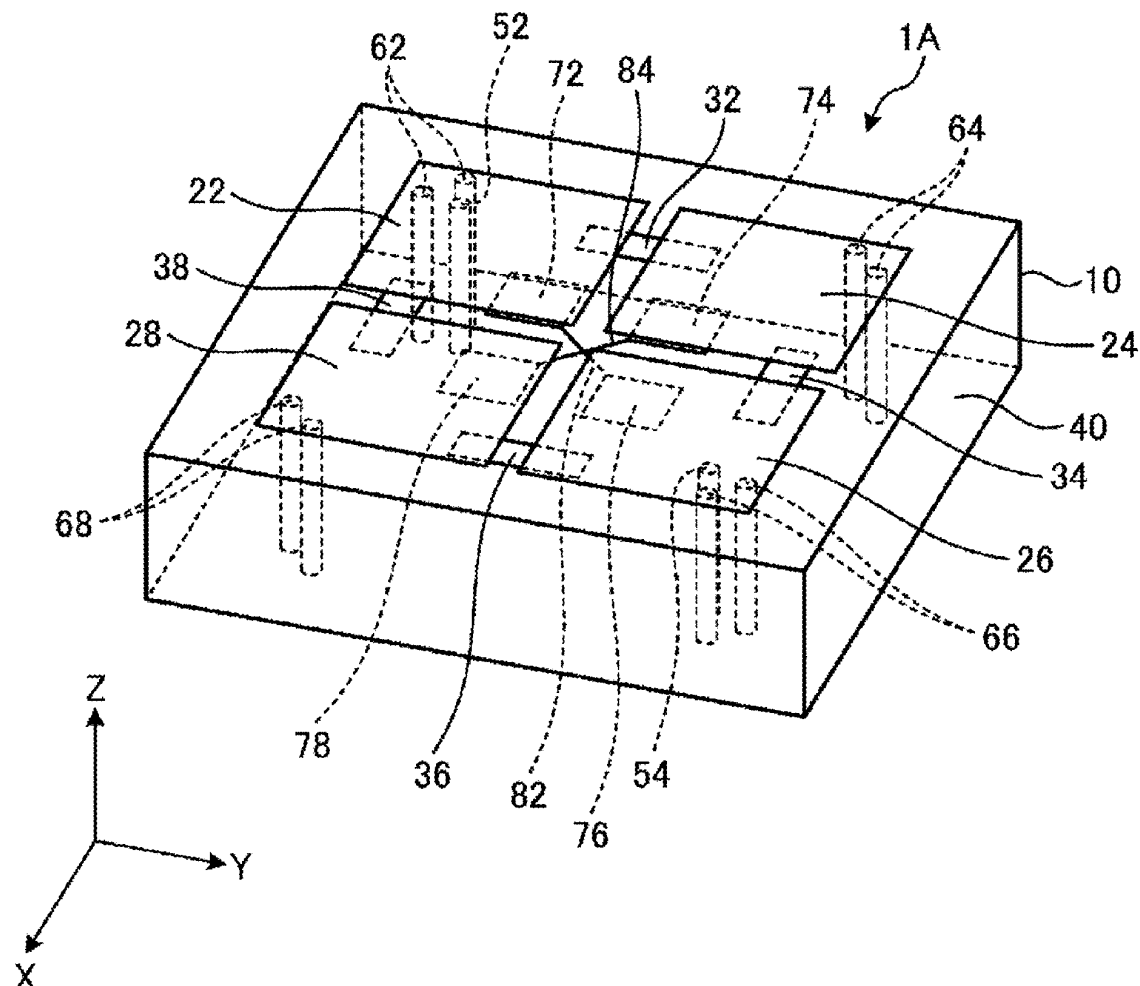
§ 371 (c)(1),

(2) Date: **Aug. 2, 2024**(30) **Foreign Application Priority Data**

Feb. 3, 2022 (JP) 2022-015910

Publication Classification(51) **Int. Cl.**
H01Q 21/06 (2006.01)(52) **U.S. Cl.**
CPC **H01Q 21/065** (2013.01); **H01Q 9/0414**
(2013.01); **H01Q 9/0421** (2013.01); **H01Q**
9/045 (2013.01); **H01Q 21/0006** (2013.01)(57) **ABSTRACT**

An antenna element includes: a first conductor, a second conductor, a third conductor, and a fourth conductor; a first coupling conductor configured to capacitively couple the first conductor, the second conductor, the third conductor, and the fourth conductor; a second coupling conductor configured to capacitively couple the first conductor and the second conductor; a third coupling conductor configured to capacitively couple the second conductor and the third conductor; a fourth coupling conductor configured to capacitively couple the third conductor and the fourth conductor; a fifth coupling conductor configured to capacitively couple the fourth conductor and the first conductor; a first power feeding conductor.





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(19) **United States**

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

(10) **Pub. No.: US 2026/0122767 A1**

(43) **Pub. Date: Apr. 30, 2026**

(54) **SUBSTRATE CONNECTION STRUCTURE,
ANTENNA SUBSTRATE, AND DISPLAY
DEVICE**

(71) Applicants: **Murata Manufacturing Co., Ltd.**,
Nagaokakyo-shi (JP); **Dai Nippon
Printing Co., Ltd.**, Tokyo (JP)

(72) Inventors: **Hayato NAKAMURA**, Nagaokakyo-shi
(JP); **Kaoru SUDO**, Nagaokakyo-shi
(JP); **Yuya DOKAI**, Nagaokakyo-shi
(JP); **Kazushige SATO**,
Nagaokakyo-shi (JP); **Kengo ONAKA**,
Nagaokakyo-shi (JP); **Shuji**
KAWAGUCHI, Tokyo (JP); **Kazuki**
KINOSHITA, Tokyo (JP)

(73) Assignees: **Murata Manufacturing Co., Ltd.**,
Nagaokakyo-shi (JP); **Dai Nippon
Printing Co., Ltd.**, Tokyo (JP)

(21) Appl. No.: **19/430,275**

(22) Filed: **Dec. 23, 2025**

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2024/
023560, filed on Jun. 28, 2024.

(30) **Foreign Application Priority Data**

Jul. 3, 2023 (JP) 2023-109392

Publication Classification

(51) **Int. Cl.**

H05K 1/02 (2006.01)
H01Q 1/22 (2006.01)
H01Q 1/38 (2006.01)
H05K 1/11 (2006.01)
H05K 1/14 (2006.01)

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

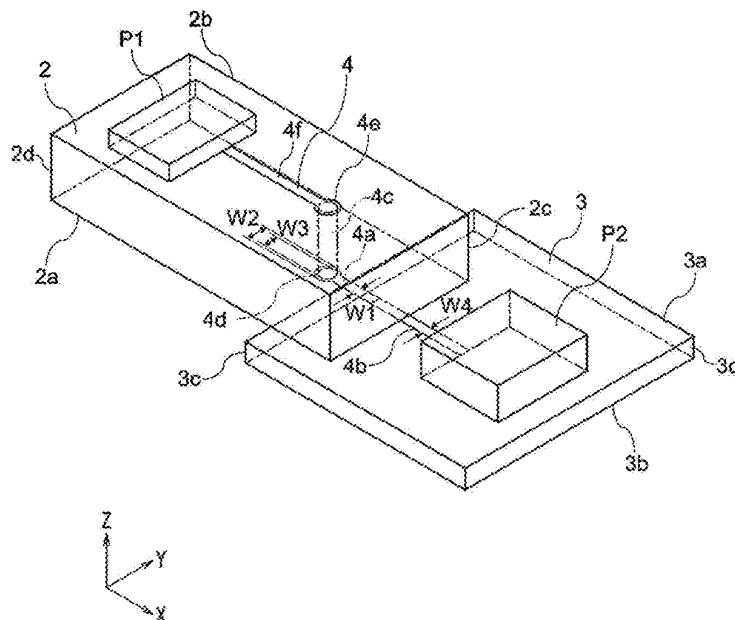
CPC **H05K 1/0242** (2013.01); **H01Q 1/2283**
(2013.01); **H01Q 1/38** (2013.01); **H05K 1/024**
(2013.01); **H05K 1/0243** (2013.01); **H05K**
1/116 (2013.01); **H05K 1/144** (2013.01);
H05K 2201/042 (2013.01); **H05K 2201/09227**
(2013.01); **H05K 2201/09236** (2013.01); **H05K**
2201/09681 (2013.01)

(57)

ABSTRACT

A substrate connection structure includes a first substrate, a second substrate partially facing the first substrate, and a transmission line extending over the first and second substrates. The transmission line includes a first transmission line on a first surface of the first substrate facing the second substrate, a second transmission line on a second surface of the second substrate facing the first substrate. A through-hole wiring is located at a position not overlapping with the second transmission line. A connection conductor is on the first surface and connects to the through-hole wiring. The first transmission line connect the connection conductor to the second transmission line. A size of the first transmission line is smaller than a size of the connection conductor in a direction orthogonal to a direction in which the first transmission line extends.

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US 20260128499A1

(19) **United States**

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

(10) **Pub. No.: US 2026/0128499 A1**

(43) **Pub. Date: May 7, 2026**

(54) **FOLDABLE ELECTRONIC DEVICE**

(30) **Foreign Application Priority Data**

(71) Applicant: **HUAWEI TECHNOLOGIES CO., LTD.**, Shenzhen (CN)

Jun. 21, 2023 (CN) 202310748091.6

Mar. 19, 2024 (CN) 202410313049.6

(72) Inventors: **Liang Xue**, Shanghai (CN); **Jiaming Wang**, Shanghai (CN); **Dong Yu**, Shanghai (CN); **Jikang Wang**, Shanghai (CN); **Huatao Liu**, Shanghai (CN); **Baokun Xi**, Shenzhen (CN); **Kun Feng**, Shanghai (CN)

Publication Classification

(51) **Int. Cl.**

H01Q 1/22 (2006.01)

H01Q 1/48 (2006.01)

H01Q 9/00 (2006.01)

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

CPC **H01Q 1/22** (2013.01); **H01Q 1/48** (2013.01); **H01Q 9/00** (2013.01)

(73) Assignee: **HUAWEI TECHNOLOGIES CO., LTD.**, Shenzhen (CN)

(21) Appl. No.: **19/426,907**

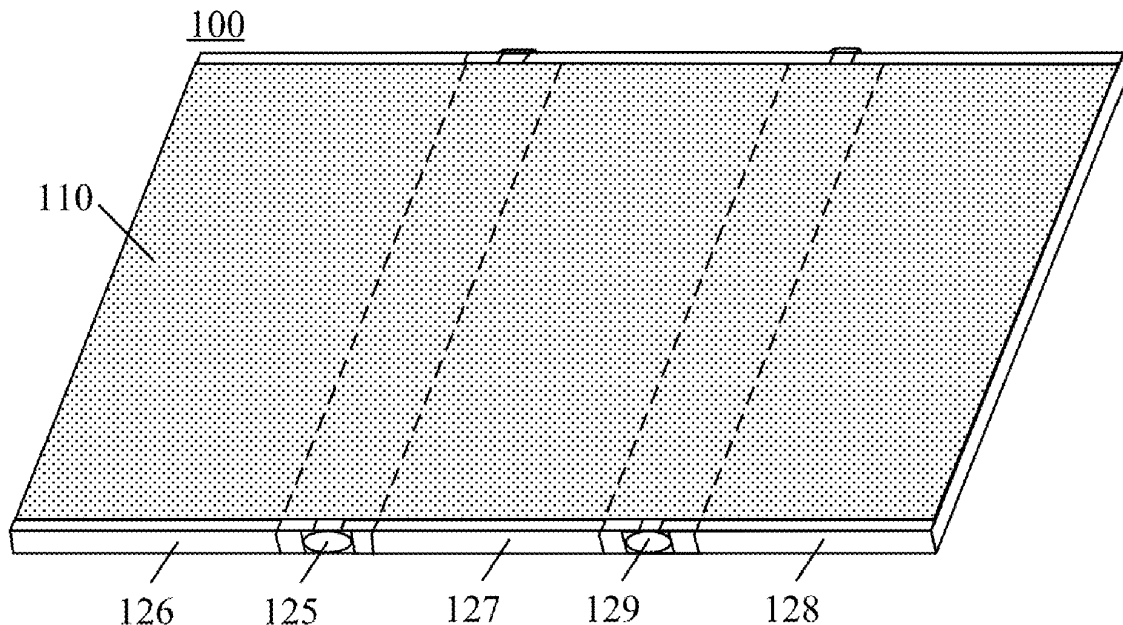
(57) **ABSTRACT**

(22) Filed: **Dec. 19, 2025**

A foldable electronic device includes an antenna, where the antenna uses a first side frame and a second side frame that are disposed in the foldable electronic device as radiators. A part of the first side frame is used as a feed stub, and a part of the second side frame is used as a parasitic stub. A gap is provided on the parasitic stub, so that a radiation aperture of the parasitic stub is increased.

Related U.S. Application Data

(63) Continuation of application No. PCT/CN2024/100152, filed on Jun. 19, 2024.





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(19) **United States**

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

(10) **Pub. No.: US 2026/0128502 A1**

(43) **Pub. Date: May 7, 2026**

(54) **ELECTRONIC DEVICE**

Publication Classification

(71) Applicant: **REALME MOBILE
TELECOMMUNICATIONS
(SHENZHEN) CO., LTD.**, Shenzhen
(CN)

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 1/52 (2006.01)
H01Q 21/28 (2006.01)

(72) Inventors: **Tao ZHANG**, Shenzhen (CN); **En WU**,
Shenzhen (CN)

(52) **U.S. Cl.**
CPC **H01Q 1/243** (2013.01); **H01Q 1/521**
(2013.01); **H01Q 21/28** (2013.01)

(73) Assignee: **REALME MOBILE
TELECOMMUNICATIONS
(SHENZHEN) CO., LTD.**, Shenzhen
(CN)

(57) **ABSTRACT**

(21) Appl. No.: **19/436,978**

(22) Filed: **Dec. 30, 2025**

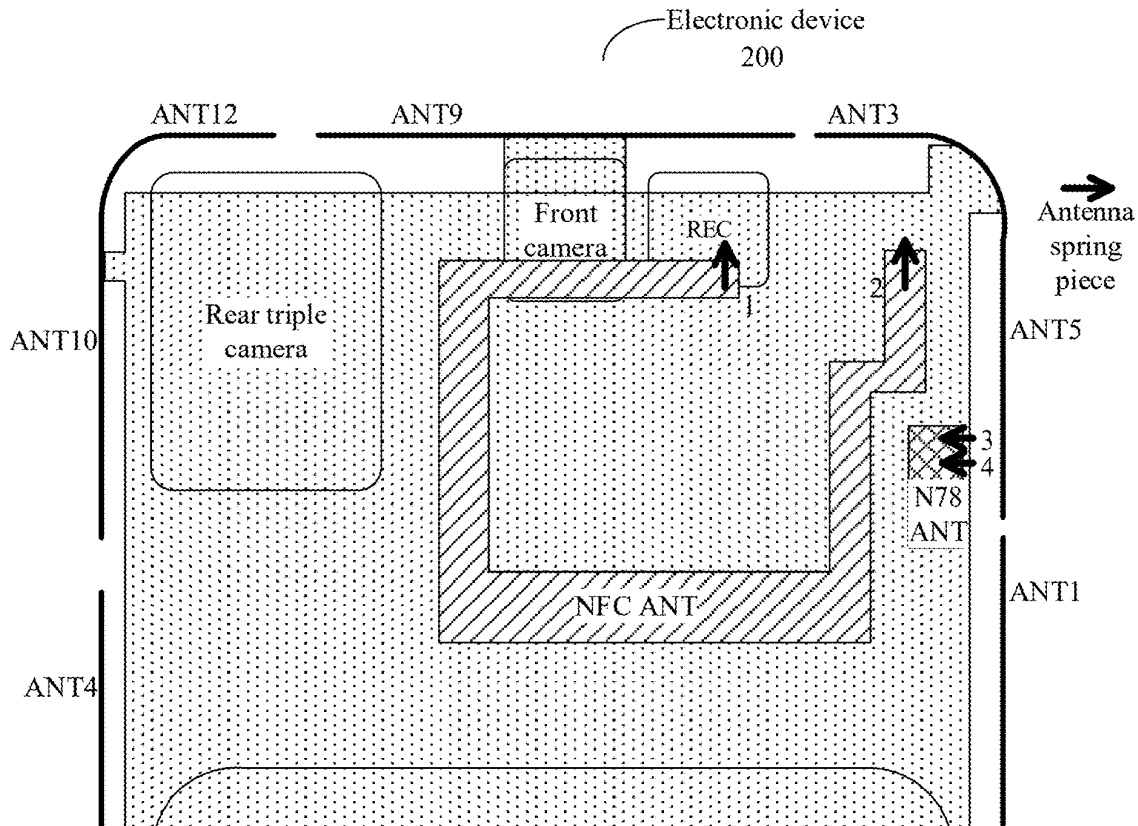
Related U.S. Application Data

(63) Continuation of application No. PCT/CN2024/
130209, filed on Nov. 6, 2024.

Foreign Application Priority Data

Nov. 14, 2023 (CN) 202311519616.5

An electronic device is provided and includes a first antenna and a second antenna; the first antenna is a near field communication antenna disposed above a pressure plate bracket of the electronic device, and is disposed adjacent to the second antenna; a radiator of the first antenna is connected to an anti-interference circuit, and a connection point between the radiator and the anti-interference circuit is located at a location on the radiator of the first antenna other than a feed point of the first antenna and a ground point of the first antenna; the anti-interference circuit is configured to reduce interference between the first antenna and the second antenna.





US 20260128508A1

(19) **United States**

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

(10) **Pub. No.: US 2026/0128508 A1**

(43) **Pub. Date: May 7, 2026**

(54) **ELECTRONIC DEVICE COMPRISING
ANTENNA**

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

(72) Inventors: **Juneseok LEE**, Suwon-si (KR);
Sanghoon PARK, Suwon-si (KR);
Sohyeon JUNG, Suwon-si (KR);
Jungyub LEE, Suwon-si (KR)

(21) Appl. No.: **19/434,895**

(22) Filed: **Dec. 29, 2025**

Related U.S. Application Data

(63) Continuation of application No. PCT/KR2024/
006044, filed on May 3, 2024.

Foreign Application Priority Data

Jun. 29, 2023 (KR) 10-2023-0084427
Aug. 24, 2023 (KR) 10-2023-0111606

Publication Classification

(51) **Int. Cl.**
H01Q 1/52 (2006.01)
H01Q 1/24 (2006.01)

H01Q 9/26 (2006.01)

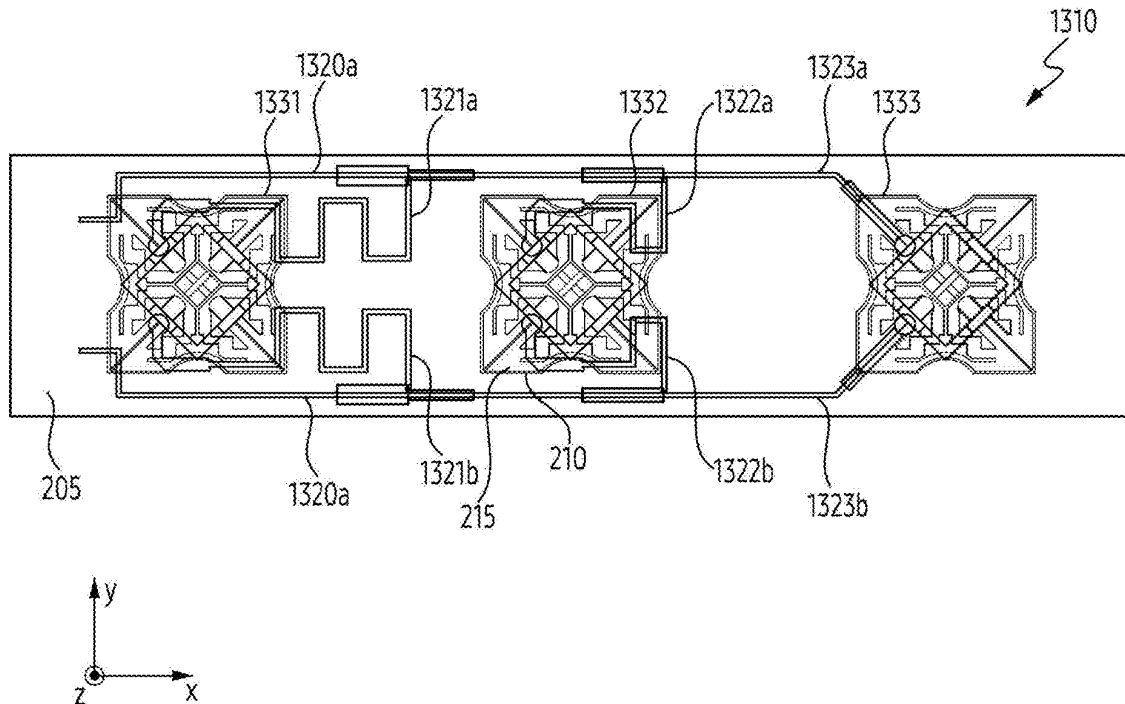
H01Q 15/24 (2006.01)

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

CPC **H01Q 1/523** (2013.01); **H01Q 1/246**
(2013.01); **H01Q 9/26** (2013.01); **H01Q 15/24**
(2013.01)

(57) **ABSTRACT**

An antenna module is provided. The antenna module includes an insulating plate including at least one conductive pattern, and a plurality of radiation structures disposed on a surface of the insulating plate, wherein each radiation structure of the plurality of radiation structures includes a substrate portion and a support portion disposed between the substrate portion and the insulating plate, wherein the substrate portion includes a non-conductive substrate and a metal pattern formed on the non-conductive substrate and configured to radiate signals, wherein the support portion includes a plurality of side areas and a feeding area, wherein the at least one conductive pattern is electrically connected to a first feeding portion for a first polarization and a second feeding portion for a second polarization, wherein the first feeding portion is disposed along at least one first side area among the plurality of side areas of the support portion and the feeding area, and wherein the second feeding portion is disposed along at least one second side area among the plurality of side areas of the support portion and the feeding area.





US 20260128516A1

(19) **United States**(12) **Patent Application Publication**
CHANG et al.(10) **Pub. No.: US 2026/0128516 A1**(43) **Pub. Date: May 7, 2026**(54) **MOBILE DEVICE SUPPORTING WIDEBAND OPERATION**(52) **U.S. Cl.**CPC **H01Q 5/20** (2015.01); **H01Q 1/2266** (2013.01); **H01Q 9/0421** (2013.01)(71) Applicant: **Acer Incorporated**, New Taipei City (TW)

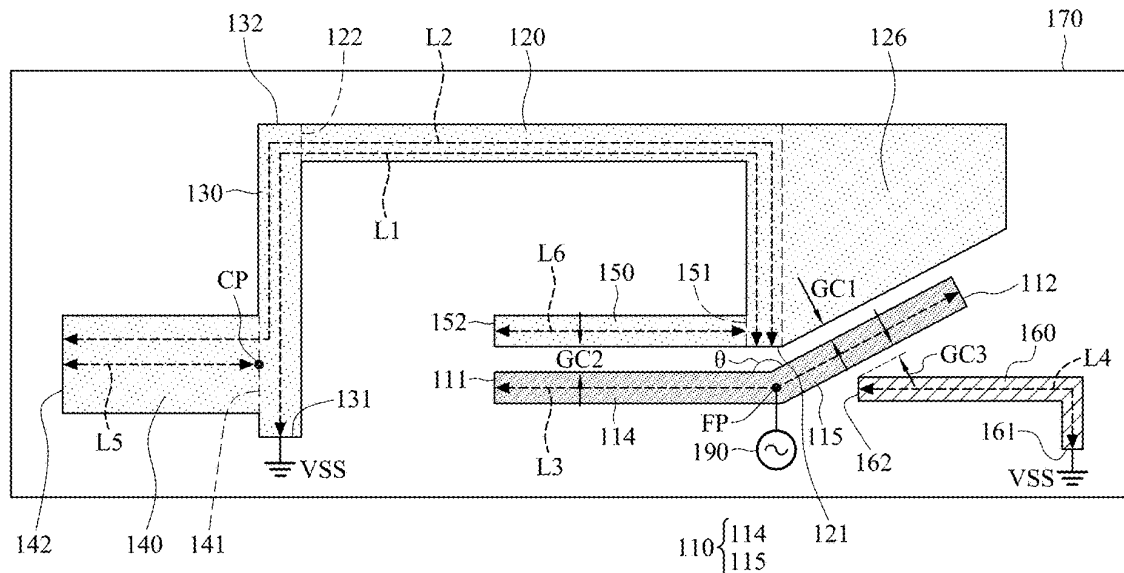
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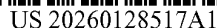
ABSTRACT(72) Inventors: **Kun-Sheng CHANG**, New Taipei City (TW); **Ching-Chi LIN**, New Taipei City (TW)

A mobile device includes a feeding radiation element, a first radiation element, a shorting radiation element, a second radiation element, a third radiation element, and a fourth radiation element. The feeding radiation element has a feeding point. The first radiation element is adjacent to the feeding radiation element. The first radiation element is coupled through the shorting radiation element to a ground voltage. The second radiation element is coupled to the shorting radiation element. The third radiation element is coupled to the first radiation element. The third radiation element is adjacent to the feeding radiation element. The fourth radiation element is coupled to the ground voltage. The fourth radiation element is adjacent to the feeding radiation element. An antenna structure is formed by the feeding radiation element, the first radiation element, the shorting radiation element, the second radiation element, the third radiation element, and the fourth radiation element.

(21) Appl. No.: **18/983,711**(22) Filed: **Dec. 17, 2024**(30) **Foreign Application Priority Data**

Nov. 5, 2024 (TW) 113142216

Publication Classification(51) **Int. Cl.****H01Q 5/20** (2015.01)**H01Q 1/22** (2006.01)**H01Q 9/04** (2006.01)100



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

(43) **Pub. Date:** **May 7, 2026**

CPC *H01Q 5/30* (2015.01); *H01Q 1/38*
(2013.01); *H01Q 1/50* (2013.01)

(57) **ABSTRACT**

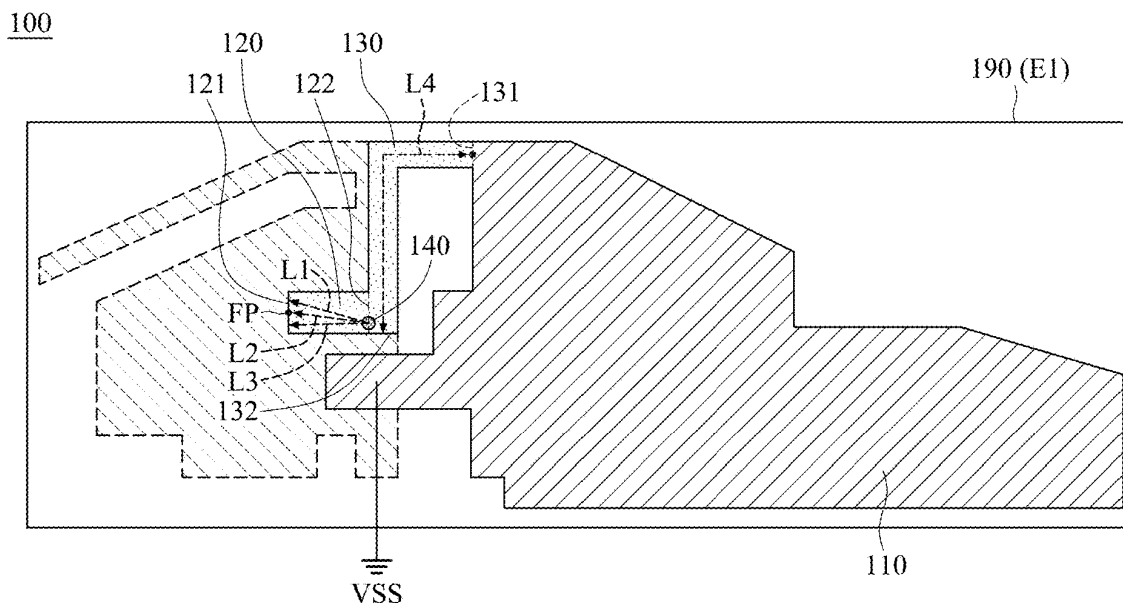
An antenna structure includes a ground element, a feeding radiation element, a connection radiation element, a conductive via element, a first radiation element, a second radiation element, a third radiation element, and a nonconductive support element. The feeding radiation element is coupled through the connection radiation element to the ground element. The conductive via element is coupled to the feeding radiation element. The first radiation element, the second radiation element, and the third radiation element are coupled to the conductive via element. A slot is formed between the first radiation element and the second radiation element. The nonconductive support element has a first surface and a second surface which are opposite to each other. The conductive via element penetrates the nonconductive support element. The ground element, the feeding radiation element, and the connection radiation element are disposed on the first surface of the nonconductive support element.

(30) **Foreign Application Priority Data**

Nov. 5, 2024 (TW) 113211995

Publication Classification

(51) **Int. Cl.**
H01Q 5/30 (2015.01)
H01Q 1/38 (2006.01)
H01Q 1/50 (2006.01)





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(19) **United States**

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

(10) **Pub. No.: US 2026/0128520 A1**

(43) **Pub. Date: May 7, 2026**

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

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

CPC **H01Q 5/35** (2015.01); **H03H 7/01**
(2013.01); **H04B 1/40** (2013.01)

(71) Applicant: **GUANGDONG OPPO MOBILE
TELECOMMUNICATIONS CORP.,
LTD.**, Dongguan (CN)

(57)

ABSTRACT

(72) Inventors: **Zhimin ZENG**, Dongguan (CN); **Jin
PAN**, Dongguan (CN); **Haijun TANG**,
Dongguan (CN)

Provided are an antenna assembly and an electronic device. The antenna assembly includes a first radiator and a first feed source. The first radiator includes a first ground terminal, a first feeding point, and a first free terminal. The first feed source is configured to generate first and second radio frequency signals, and is electrically connected to the first feeding point. When the antenna assembly is in a free state, the first and second radio frequency signals are adapted to excite the first radiator to support a first frequency band and a second frequency band respectively, frequencies of the second frequency band being lower than frequencies of the first frequency band. When the electronic device to which the antenna assembly is applied is covered with a metal protective case, the second radio frequency signal excites the first radiator to support at least part of the first frequency band.

(21) Appl. No.: **19/374,154**

(22) Filed: **Oct. 30, 2025**

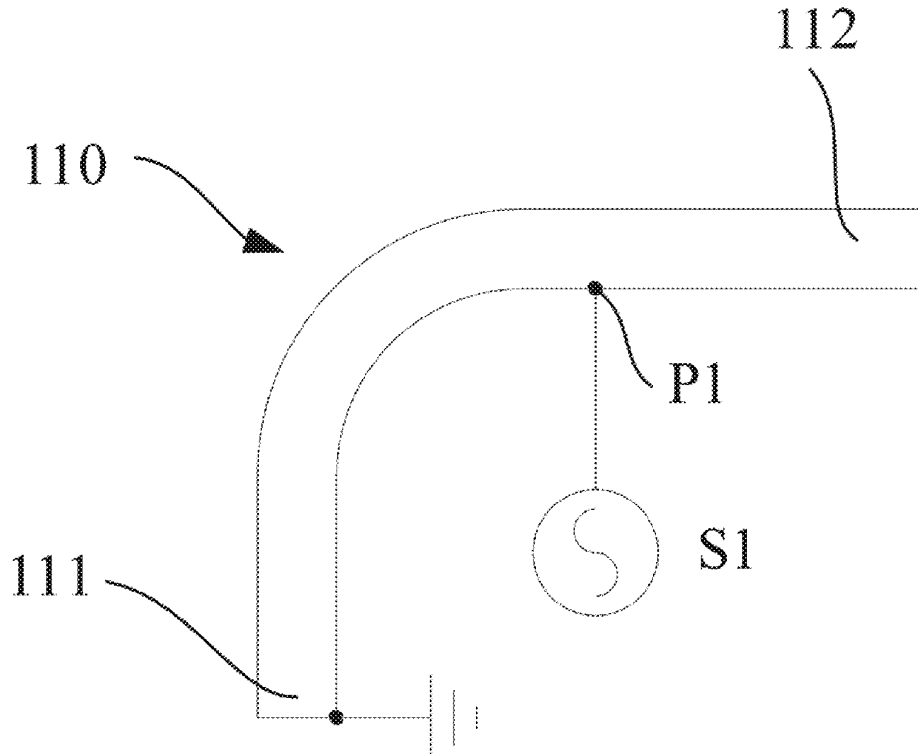
(30) **Foreign Application Priority Data**

Nov. 5, 2024 (CN) 202411570831.2

Publication Classification

(51) **Int. Cl.**
H01Q 5/35 (2015.01)
H03H 7/01 (2006.01)
H04B 1/40 (2015.01)

10





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(19) **United States**

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

(10) **Pub. No.: US 2026/0128525 A1**

(43) **Pub. Date: May 7, 2026**

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

Publication Classification

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

(51) **Int. Cl.**
H01Q 9/42 (2006.01)
H01Q 1/24 (2006.01)
H01Q 5/335 (2015.01)
H01Q 9/04 (2006.01)

(72) Inventors: **Qing Liu**, Shenzhen (CN); **Qi Shi**,
Shenzhen (CN); **Qun Guo**, Dongguan
(CN)

(52) **U.S. Cl.**
CPC **H01Q 9/42** (2013.01); **H01Q 1/243**
(2013.01); **H01Q 5/335** (2015.01); **H01Q**
9/0421 (2013.01)

(21) Appl. No.: **18/706,129**

(57) **ABSTRACT**

(22) PCT Filed: **Oct. 20, 2022**

(86) PCT No.: **PCT/CN2022/126348**

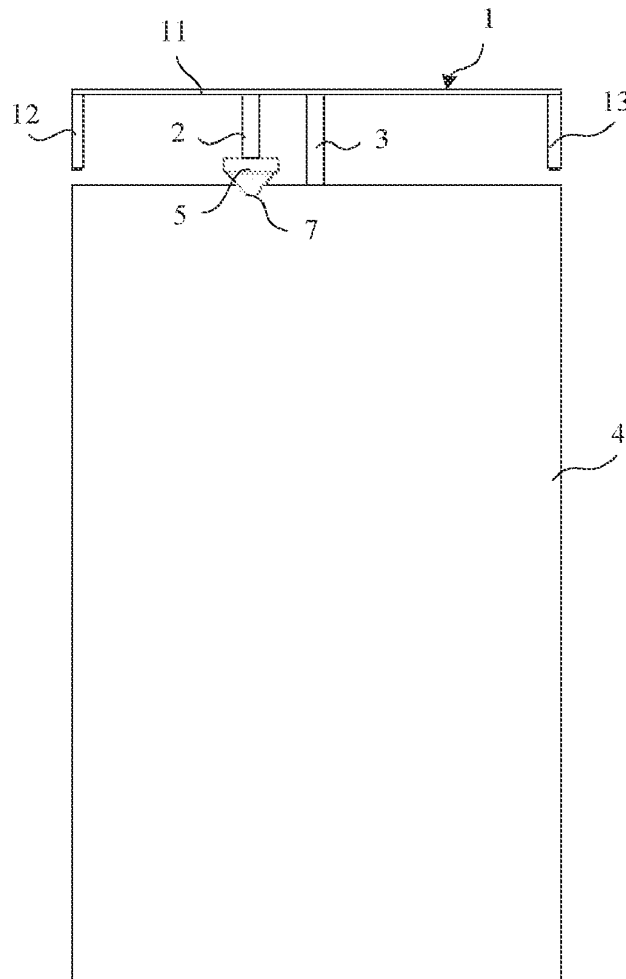
§ 371 (c)(1).

(2) Date: **Apr. 30, 2024**

An antenna apparatus includes an antenna patch, a feed line, a capacitor, and a ground line. One end of the feed line is connected to the antenna patch. The other end of the feed line is connected to the capacitor in series. One end of the ground line is connected to the antenna patch. The other end of the ground line is configured to connect to the ground plane. The antenna patch and the ground plane remain spaced apart. The antenna patch, the feed line, the capacitor and the ground line are together arranged in a configuration to excite operation modes corresponding to three resonances.

(30) **Foreign Application Priority Data**

Nov. 5, 2021 (CN) 202111304069.X





US 20260128526A1

(19) **United States**

(12) **Patent Application Publication**
Kodama

(10) **Pub. No.: US 2026/0128526 A1**

(43) **Pub. Date: May 7, 2026**

(54) **HEAD-MOUNTED ELECTRONIC DEVICE
AND ANTENNA STRUCTURE**

(52) **U.S. Cl.**
CPC **H01Q 9/42** (2013.01); **H01Q 1/273**
(2013.01); **H01Q 5/10** (2015.01)

(71) Applicant: **Goertek Inc.**, Weifang, Shandong (CN)

(72) Inventor: **Kenichiro Kodama**, Shandong (CN)

(73) Assignee: **Goertek Inc.**, Weifang, Shandong (CN)

(21) Appl. No.: **19/117,508**

(22) PCT Filed: **Jan. 4, 2023**

(86) PCT No.: **PCT/CN2023/070295**

§ 371 (c)(1),

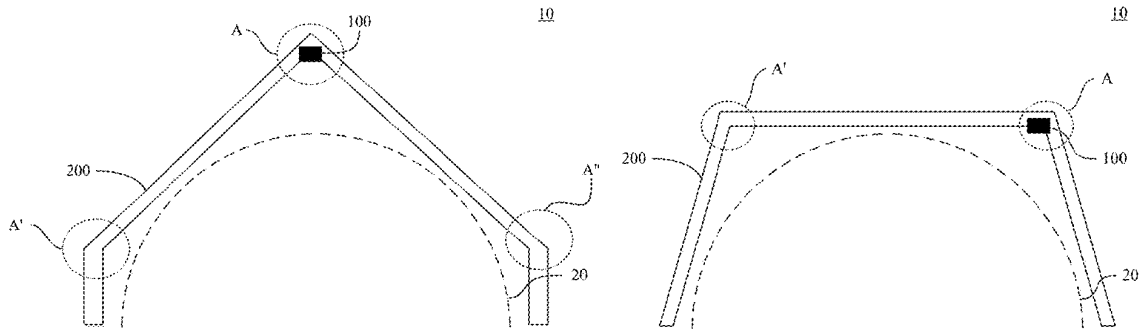
(2) Date: **Apr. 1, 2025**

Publication Classification

(51) **Int. Cl.**
H01Q 9/42 (2006.01)
H01Q 1/27 (2006.01)
H01Q 5/10 (2015.01)

(57) **ABSTRACT**

A head-mounted electronic device worn by a user and an antenna structure are provided. The head-mounted electronic device comprises the antenna structure and housing, where the antenna structure is configured to transmit or receive wireless signals and is located at a portion of the housing. The portion protrudes away from a head of the user. The antenna structure may comprise a first electrode and a second electrode located at different sides of a feeding point, where the first electrode and the second electrode serve as at least a part of a first antenna and at least a part of the second antenna, respectively, and are configured to transmit or receive the wireless signals of different frequencies.





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CHEN et al.

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(54) **CIRCULARLY POLARIZED ANTENNA AND COMMUNICATION SYSTEM**

(52) **U.S. Cl.**
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(21) Appl. No.: **18/938,480**

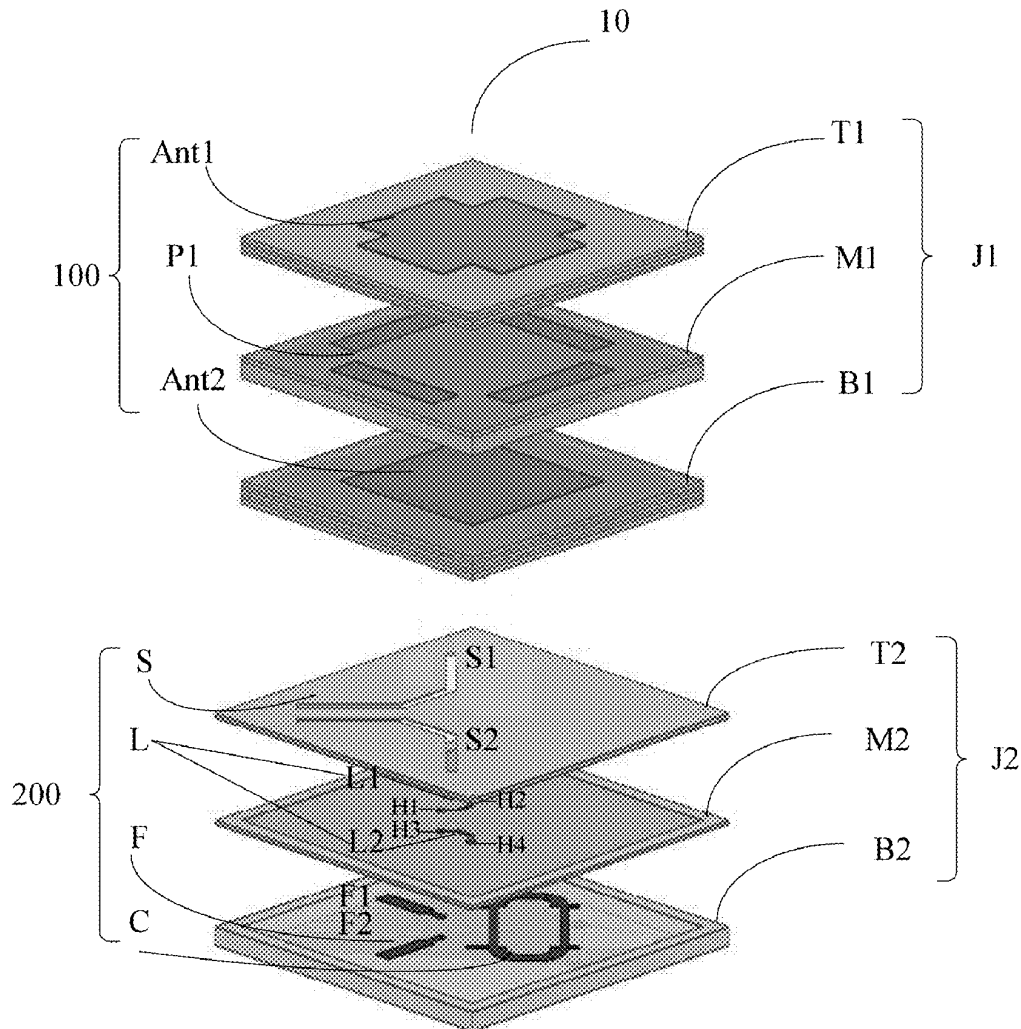
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H01Q 1/28 (2006.01)
H01Q 13/10 (2006.01)
H01Q 19/02 (2006.01)

(57) **ABSTRACT**

A circularly polarized antenna includes an antenna unit and a feeding unit, and the antenna unit and the feeding unit are stacked up and down; the antenna unit includes a first antenna subunit arranged on a top layer of the first substrate, a parasitic element arranged in a middle layer of the first substrate, and a second antenna subunit arranged on a bottom layer of the first substrate; the feeding unit includes a coupling slot group, arranged on a top layer of the second substrate; a matching microstrip line group, arranged on a middle layer of the second substrate; a feeding line group, arranged on a bottom layer of the second substrate; a branch line coupler, arranged on a bottom layer of the second substrate, wherein the matching microstrip line group is electrically connected between the feeding line group and the branch line coupler through a hole group.





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HORIGUCHI

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(54) **ANTENNA DEVICE**

Publication Classification

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(21) Appl. No.: **19/363,254**

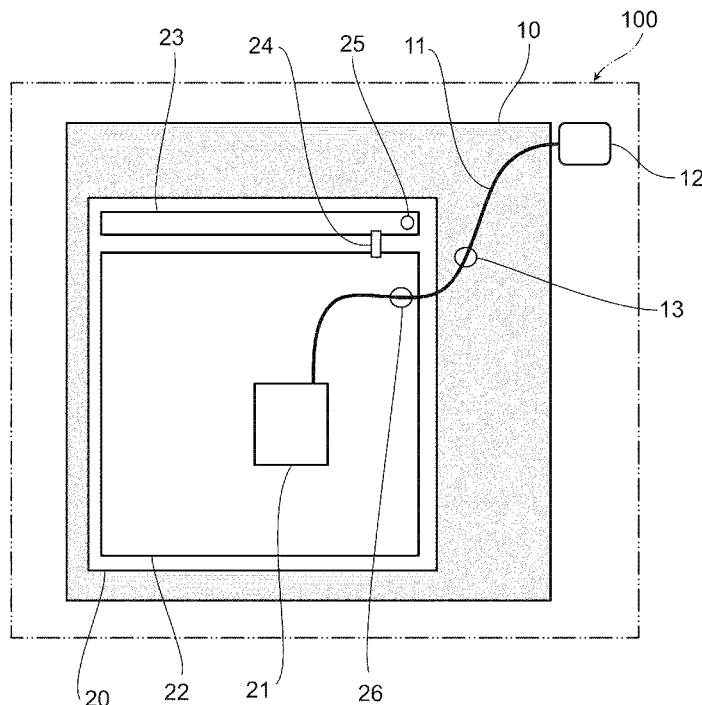
(22) Filed: **Oct. 20, 2025**

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2023/025052,
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(57) **ABSTRACT**

An antenna device includes: a housing provided with an antenna; a control board provided for the housing; a signal ground constituting a reference ground with respect to a circuit in the control board, and on which a wireless module connected with the antenna by a coaxial cable is mounted; a frame ground constituting a ground for the housing; a capacitor connecting the signal ground and the frame ground; a housing-side ground part grounding the coaxial cable; and a board-side ground part grounding the coaxial cable. A loop length of a closed loop passing through the housing-side ground part, the board-side ground part, the capacitor, and a connection part between the housing and the frame ground is a length less than a wavelength corresponding to a maximum transmission/reception frequency of the wireless module.





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(19) **United States**

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SUDO et al.

(10) **Pub. No.: US 2026/0112822 A1**

(43) **Pub. Date: Apr. 23, 2026**

(54) **ANTENNA SUBSTRATE AND ANTENNA
DEVICE**

Publication Classification

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(51) **Int. Cl.**
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(52) **U.S. Cl.**
CPC **H01Q 21/24** (2013.01); **H01Q 5/307**
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(57) **ABSTRACT**

(21) Appl. No.: **19/428,362**

(22) Filed: **Dec. 22, 2025**

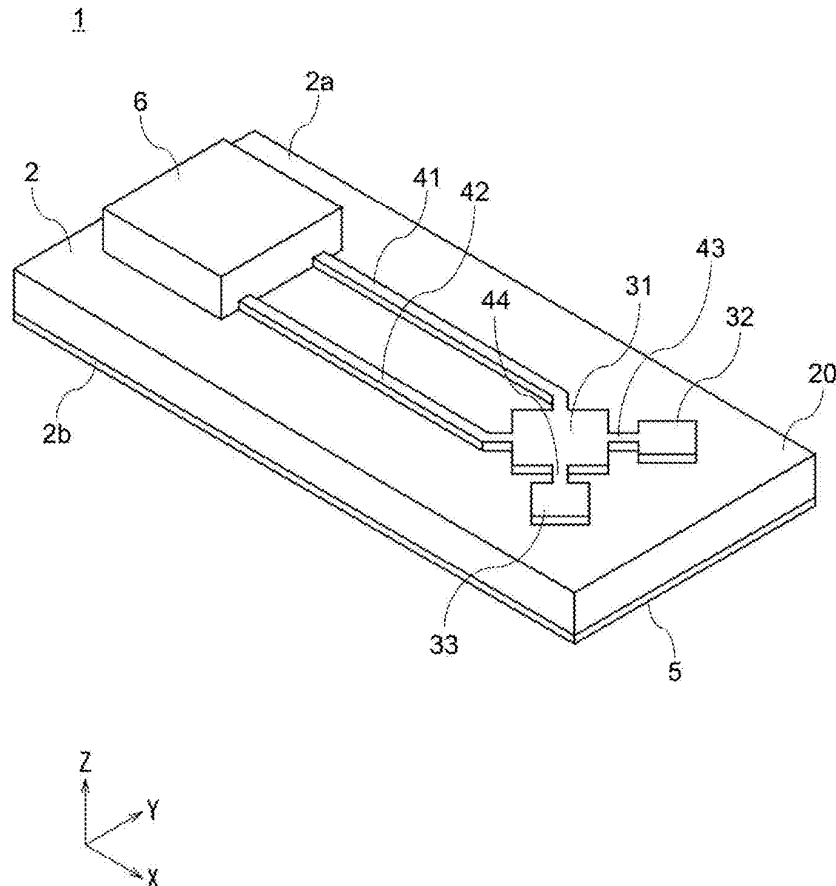
Related U.S. Application Data

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020878, filed on Jun. 7, 2024.

(30) **Foreign Application Priority Data**

Jul. 3, 2023 (JP) 2023-109396

An antenna substrate includes a dielectric substrate having a main surface; and first to third planar radiation electrodes and first and second feed lines located on the main surface of the dielectric substrate. A size difference between the first and second radiation electrodes and a size difference between the first and third radiation electrodes are larger than a size difference between the second and third radiation electrodes. The first and second feed lines are connected to at least one of the first to third radiation electrode at first and second connection points different from each other. The first radiation electrode is adjacent to the second radiation electrode in a first direction and is adjacent to the third radiation electrode in a second direction different from the first direction.





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

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(54) **THERMOPLASTIC RESIN COMPOSITION,
MOLDED ARTICLE, AND COMPONENT
FOR TELECOMMUNICATION APPARATUS**

Publication Classification

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B29C 45/00 (2006.01)
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(52) **U.S. Cl.**
CPC *C08K 3/22* (2013.01); *B29C 45/0001*
(2013.01); *C08K 3/2279* (2013.01); *B29C*
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(2013.01); *B29L 2031/3456* (2013.01); *C08K*
2003/2231 (2013.01)

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(21) Appl. No.: **19/149,219**

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(86) PCT No.: **PCT/JP2024/007423**

§ 371 (c)(1),
(2) Date: **Jul. 18, 2025**

(30) **Foreign Application Priority Data**

Mar. 10, 2023 (JP) 2023-038116
Jun. 23, 2023 (JP) 2023-103666

(57) **ABSTRACT**

The present disclosure is directed to providing a thermo-
plastic resin composition that serves as a material for a
component for a telecommunication apparatus with excel-
lent performance as an antenna and that exhibits excellent
antenna performance regardless of injection molding con-
ditions, particularly when injection molding is performed at
high temperatures. The present disclosure contains a poly-
phenylene ether-based resin and a laser direct structuring
additive (LDS additive), wherein the inter-particle distance
of the LDS additive is 2.2 to 3.2 μm , the Vicat softening
temperature is 90° C. or higher, and the water absorption rate
is 1.5% or less.

