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(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2024/0310310 A1**

(43) **Pub. Date: Sep. 19, 2024**

Grodzki et al.

(54) **MAGNETIC RESONANCE APPARATUS FOR DETECTING AT LEAST ONE PROPERTY OF A SAMPLE**

(71) Applicant: **Siemens Healthineers AG**, Forchheim (DE)

(72) Inventors: **David Grodzki**, Erlangen (DE); **Stephan Biber**, Erlangen (DE)

(73) Assignee: **Siemens Healthineers AG**, Forchheim (DE)

(21) Appl. No.: **18/603,470**

(22) Filed: **Mar. 13, 2024**

(30) **Foreign Application Priority Data**

Mar. 15, 2023 (EP) 23162073.3

Publication Classification

(51) **Int. Cl.**

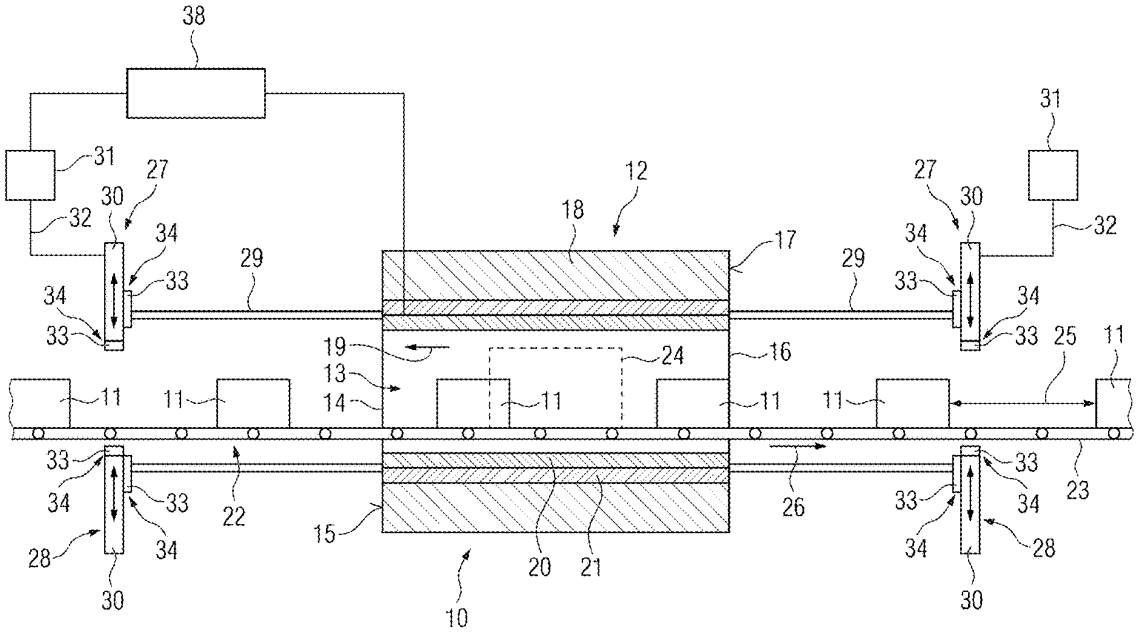
G01N 24/08 (2006.01)
G01N 33/00 (2006.01)
G01N 35/04 (2006.01)

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

CPC ***G01N 24/08*** (2013.01); ***G01N 33/0098*** (2013.01); ***G01N 35/04*** (2013.01)

(57) **ABSTRACT**

A magnetic resonance apparatus is described for detecting at least one property of a sample, which may include a foodstuff. The magnetic resonance apparatus comprises a magnet unit, which comprises a base magnet and a RF antenna unit, a sample receiving area at least partially surrounded by the magnet unit, and a transport apparatus for introducing at least one sample into the sample receiving area. The magnetic resonance apparatus comprises an radio frequency (RF) shielding unit, which shields the sample receiving area from the outside, such as a region external to the magnetic resonance apparatus.



US 20240313388A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2024/0313388 A1**

(43) **Pub. Date: Sep. 19, 2024**

Yao et al.

(54) **ANTENNA STRUCTURE, ANTENNA MODULE, CHIP, AND ELECTRONIC DEVICE**

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

(72) Inventors: **Yu Yao**, Shanghai (CN); **Youquan Wu**, Shenzhen (CN); **Meng Hou**, Shanghai (CN)

(21) Appl. No.: **18/575,631**

(22) PCT Filed: **Jun. 28, 2022**

(86) PCT No.: **PCT/CN2022/101755**

§ 371 (c)(1),
(2) Date: **Dec. 29, 2023**

(30) **Foreign Application Priority Data**

Jun. 30, 2021 (CN) 202110742511.0

Publication Classification

(51) **Int. Cl.**

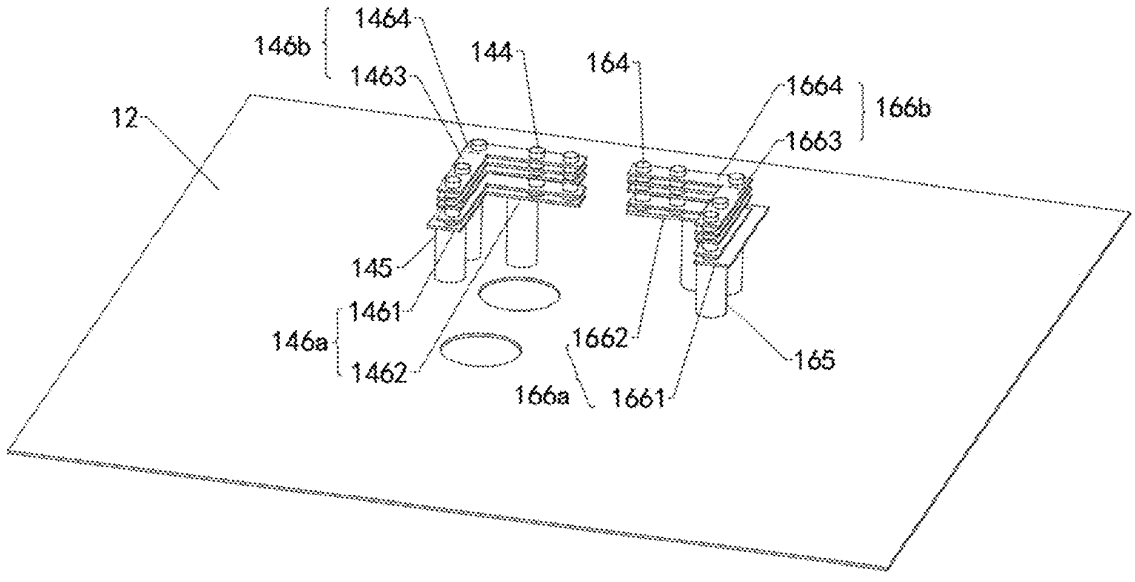
H01Q 1/22	(2006.01)
H01L 23/66	(2006.01)
H01Q 1/24	(2006.01)
H01Q 1/38	(2006.01)
H01Q 1/48	(2006.01)

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

CPC ***H01Q 1/2283*** (2013.01); ***H01L 23/66*** (2013.01); ***H01Q 1/243*** (2013.01); ***H01Q 1/38*** (2013.01); ***H01Q 1/48*** (2013.01); *H01L 2223/6677* (2013.01)

(57) **ABSTRACT**

A chip having an antenna structure comprising a ground layer, a feeding element, and an antenna element. The antenna element comprises a first metal layer, a second metal layer, a first conducting member, and a second conducting member, the first metal layer and the ground layer are disposed opposite and spaced from each other, the second metal layer is located between the first metal layer and the ground layer and is spaced from both the first metal layer and the ground layer, the second metal layer comprises a first area and a second area that are spaced from each other, the first conducting member is connected between the first metal layer and the first area of the second metal layer, and the second conducting member is connected between the ground layer and the second area of the second metal layer.



US 20240313389A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2024/0313389 A1

(43) Pub. Date: Sep. 19, 2024

SON et al.

(54) **ELECTRONIC DEVICE COMPRISING RADIATING ELEMENT**

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

(72) Inventors: **Moonsoo SON**, Suwon-si (KR); **Jeongwan PARK**, Suwon-si (KR); **Min SAKONG**, Suwon-si (KR); **Gyubok PARK**, Suwon-si (KR)

(21) Appl. No.: **18/668,762**

(22) Filed: **May 20, 2024**

Related U.S. Application Data

(63) Continuation of application No. PCT/KR2022/017446, filed on Nov. 8, 2022.

(30) **Foreign Application Priority Data**

Dec. 2, 2021 (KR) 10-2021-0170685

Publication Classification

(51) **Int. Cl.**

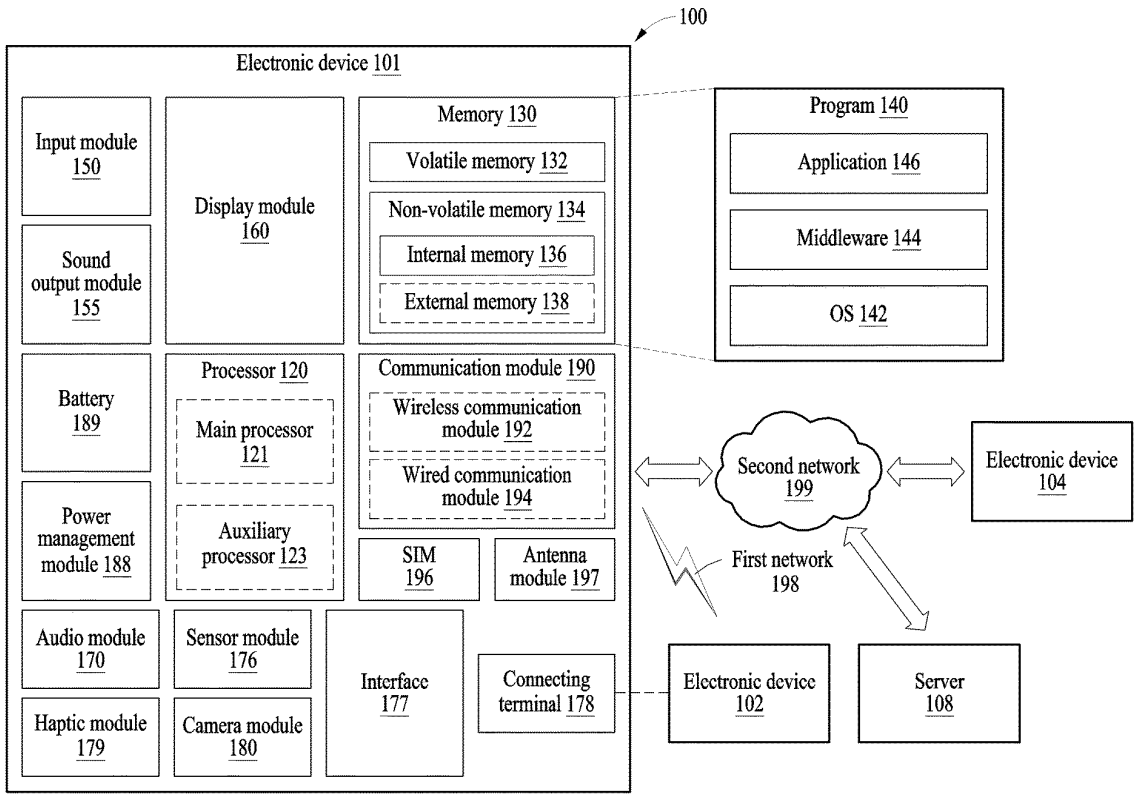
H01Q 1/24	(2006.01)
H01Q 1/46	(2006.01)
H01Q 1/48	(2006.01)

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

CPC ***H01Q 1/243*** (2013.01); ***H01Q 1/46*** (2013.01); ***H01Q 1/48*** (2013.01)

(57) **ABSTRACT**

An electronic device is provided. The electronic device includes a housing including a first plate facing a first direction, a second plate facing a second direction opposite to the first direction, and a side member formed facing a third direction so as to surround a space between the first plate and the second plate, a gap region formed by spacing apart or segmenting at least a portion of the housing, a printed circuit board (PCB) disposed inside the housing, an antenna structure including a power feeding portion and a grounding portion, at least a portion of the antenna structure being electrically connected to the PCB, and a radiating element electrically connected to the power feeding portion or the grounding portion, the radiating element being positioned such that at least a portion of the radiating element overlaps the gap region when the electronic device is viewed in the first direction, the second direction, or the third direction.



US 20240313390A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2024/0313390 A1**

(43) **Pub. Date: Sep. 19, 2024**

XIONG

(54) **ELECTRONIC DEVICE**

(71) Applicant: **VIVO MOBILE COMMUNICATION CO., LTD.**, Guangdong (CN)

(72) Inventor: **Peng XIONG**, Guangdong (CN)

(21) Appl. No.: **18/672,066**

(22) Filed: **May 23, 2024**

Related U.S. Application Data

(63) Continuation of application No. PCT/CN2022/132271, filed on Nov. 16, 2022.

(30) **Foreign Application Priority Data**

Nov. 23, 2021 (CN) 202111397168.7

Publication Classification

(51) **Int. Cl.**

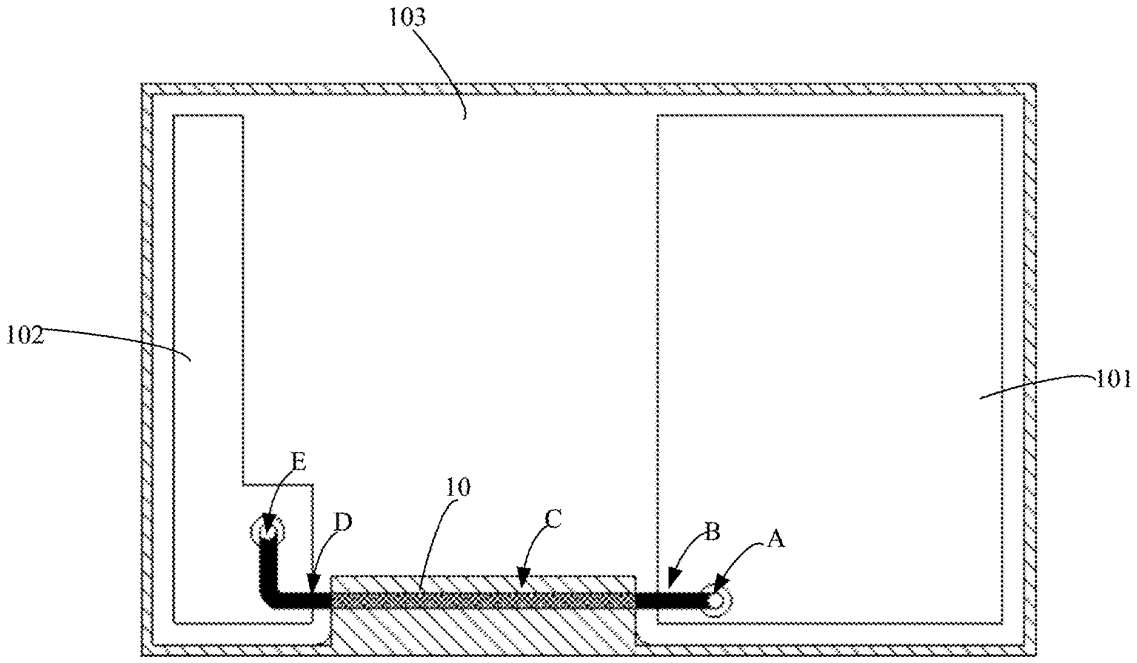
H01Q 1/24	(2006.01)
H01Q 1/50	(2006.01)
H01Q 1/52	(2006.01)
H01Q 3/22	(2006.01)

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

CPC ***H01Q 1/243*** (2013.01); ***H01Q 1/50*** (2013.01); ***H01Q 1/52*** (2013.01); ***H01Q 3/22*** (2013.01)

(57) **ABSTRACT**

This application discloses an electronic device applied to the field of electronic technologies. The electronic device includes a resonator, a connector, a tuning member, and a ground plate. The resonator is electrically connected to the ground plate via the connector and the tuning member in sequence, and the tuning member is configured to adjust a band of a spurious wave generated by the resonator to be outside an operating band of an antenna of the electronic device.



US 20240313395A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0313395 A1**

KIM et al. (43) **Pub. Date: Sep. 19, 2024**

(54) **ELECTRONIC DEVICE COMPRISING DISPLAY AND ANTENNA DISPOSED ADJACENT TO DISPLAY**

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

(72) Inventors: **Jongmin KIM**, Suwon-si (KR); **Sangho HONG**, Suwon-si (KR); **Myounggyo SEO**, Suwon-si (KR); **Hyoseok NA**, Suwon-si (KR); **Gunhee PARK**, Suwon-si (KR); **Yongam SON**, Suwon-si (KR); **Jongkwan LEE**, Suwon-si (KR); **Hanyeop LEE**, Suwon-si (KR); **Taihwan CHOI**, Suwon-si (KR)

(21) Appl. No.: **18/675,871**

(22) Filed: **May 28, 2024**

Related U.S. Application Data

(63) Continuation of application No. PCT/KR2022/018880, filed on Nov. 25, 2022.

(30) **Foreign Application Priority Data**

Nov. 25, 2021 (KR) 10-2021-0164895

Publication Classification

(51) **Int. Cl.**

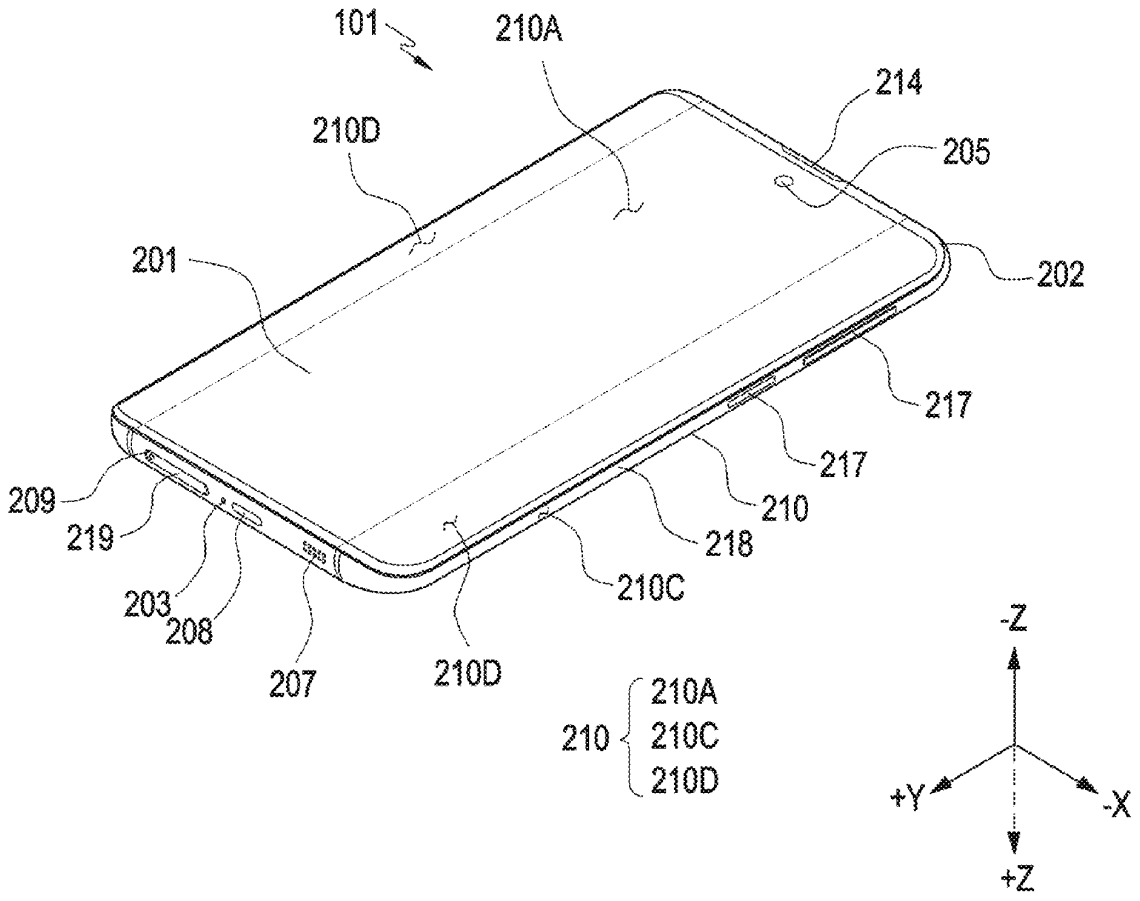
H01Q 1/52 (2006.01)
H01Q 1/22 (2006.01)
H01Q 1/24 (2006.01)

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

CPC ***H01Q 1/526*** (2013.01); ***H01Q 1/2266*** (2013.01); ***H01Q 1/243*** (2013.01)

(57) **ABSTRACT**

According to various embodiments disclosed herein, an electronic device comprises: a housing; a display; a ground sheet disposed on the rear surface of the display; a substrate disposed in an inner space of the housing; an antenna disposed on at least one side of the housing; and a flexible sheet having a display drive circuit (DDI) configured to control the display, disposed thereon, wherein openings that pass through the flexible sheet are formed in an area between the display drive circuit and the antenna, conductive members comprising a conductive material are disposed in the openings, and the conductive members are electrically connected to the ground sheet, thereby reducing the noise induced in the antenna.



US 20240313404A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0313404 A1**

Bakshi et al. (43) **Pub. Date: Sep. 19, 2024**

(54) **ELECTRONIC DEVICE WITH PATCH ANTENNA IN PACKAGING SUBSTRATE**

(71) Applicant: **Texas Instruments Incorporated**, Dallas, TX (US)

(72) Inventors: **Harshpreet Singh Phull Bakshi**, Dallas, TX (US); **Rajen Manicon Murugan**, Dallas, TX (US); **Sylvester Ankamah-Kusi**, Dallas, TX (US)

(21) Appl. No.: **18/429,140**

(22) Filed: **Jan. 31, 2024**

Related U.S. Application Data

(60) Provisional application No. 63/490,382, filed on Mar. 15, 2023.

Publication Classification

(51) **Int. Cl.**

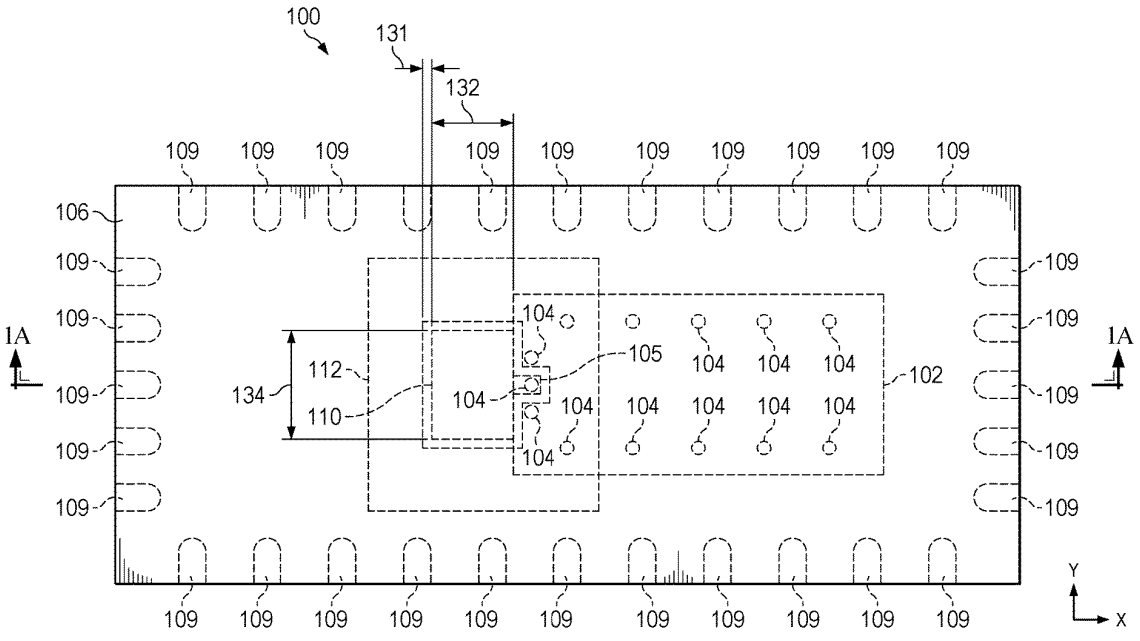
H01Q 9/04	(2006.01)
H01Q 1/22	(2006.01)
H01Q 1/38	(2006.01)
H01Q 1/42	(2006.01)

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

CPC ***H01Q 9/0407*** (2013.01); ***H01Q 1/2283*** (2013.01); ***H01Q 1/38*** (2013.01); ***H01Q 1/422*** (2013.01)

(57) **ABSTRACT**

An electronic device includes a multilevel package substrate, a semiconductor die, and a package structure, the multilevel package substrate has first, second, and third levels including respective dielectric layers and conductive features, the first level including a first trace layer with an antenna and a first via layer with a portion of a ground wall laterally spaced outward from and surrounding the antenna, and the second level including a second trace layer having a ground plane connected to the ground wall, the semiconductor die attached to the first level of the multilevel package substrate, and the package structure including a molding compound enclosing the semiconductor die and extending on a side of the antenna, where the package structure mold compound maters and thickness can be tuned for improved performance.



US 20240313408A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0313408 A1**

HUSSAIN et al. (43) **Pub. Date: Sep. 19, 2024**

(54) **SHARED APERTURE FOLDED DIPOLE ANTENNA**

(71) Applicant: **KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS**, Dhahran (SA)

(72) Inventors: **Rifaqat HUSSAIN**, Dhahran (SA); **Abdul Rehman CHISHTI**, Dhahran (SA); **Abdul AZIZ**, Dhahran (SA); **Abdullah AL-GARNI**, Dhahran (SA); **Sharif Iqbal Mitu SHEIKH**, Dhahran (SA)

(73) Assignee: **KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS**, Dhahran (SA)

(21) Appl. No.: **18/183,796**

(22) Filed: **Mar. 14, 2023**

Publication Classification

(51) **Int. Cl.**

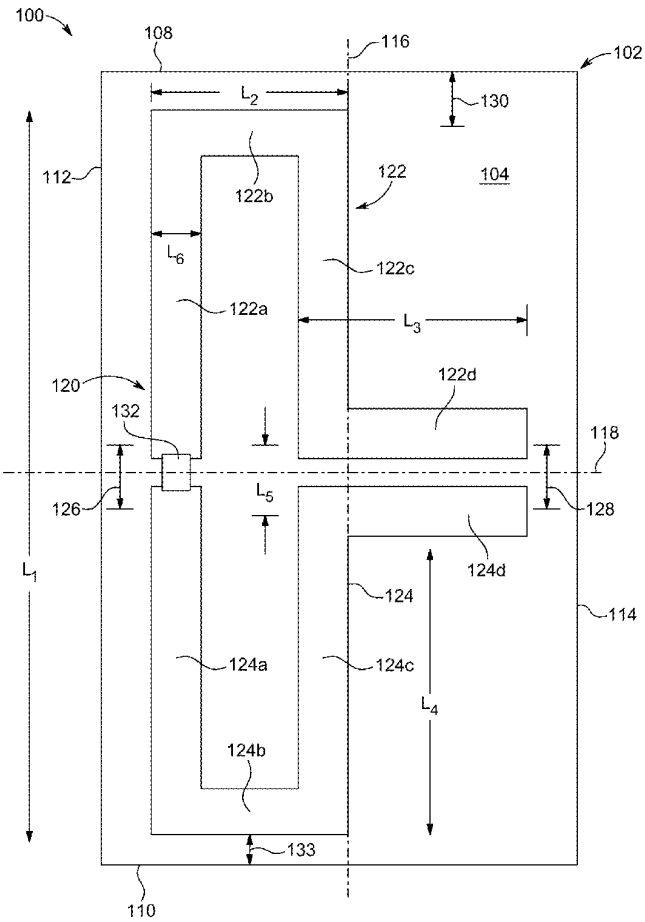
H01Q 9/26	(2006.01)
H01Q 5/307	(2006.01)
H01Q 9/06	(2006.01)
H05K 3/12	(2006.01)

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

CPC ***H01Q 9/26*** (2013.01); ***H01Q 5/307*** (2015.01); ***H01Q 9/065*** (2013.01); ***H05K 3/1283*** (2013.01); *H05K 3/30* (2013.01)

(57) **ABSTRACT**

A shared aperture multi-band antenna is described. The antenna includes a dielectric circuit board, a folded dipole microstrip antenna, and a lumped inductor. The folded dipole microstrip antenna is formed on a top side of the dielectric circuit board. The microstrip antenna includes two meander paths. The two meander paths enclose a shared aperture therebetween. The lumped inductor is inserted across a first gap near the third edge. A first pair of parallel metallic patches, a second pair of parallel metallic patches, and a third pair of parallel metallic patches are located on the bottom side. The antenna resonates in a dual band frequency range comprising a first resonance band in a range of 0.4 GHz to 0.6 GHz and a second resonance band in a range of 4.7 GHZ to 5.8 GHz upon application of an input signal at both a first feed port and a second feed port.



US 20240313410A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2024/0313410 A1**

(43) **Pub. Date: Sep. 19, 2024**

Zhou et al.

(54) **TERMINAL MONOPOLE ANTENNA**

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

(72) Inventors: **Dawei Zhou**, Shenzhen (CN); **Yuanpeng Li**, Shenzhen (CN)

(21) Appl. No.: **18/279,525**

(22) PCT Filed: **Aug. 17, 2022**

(86) PCT No.: **PCT/CN2022/113116**

§ 371 (c)(1),
(2) Date: **Aug. 30, 2023**

(30) **Foreign Application Priority Data**

Sep. 3, 2021 (CN) 202111034604.4

Publication Classification

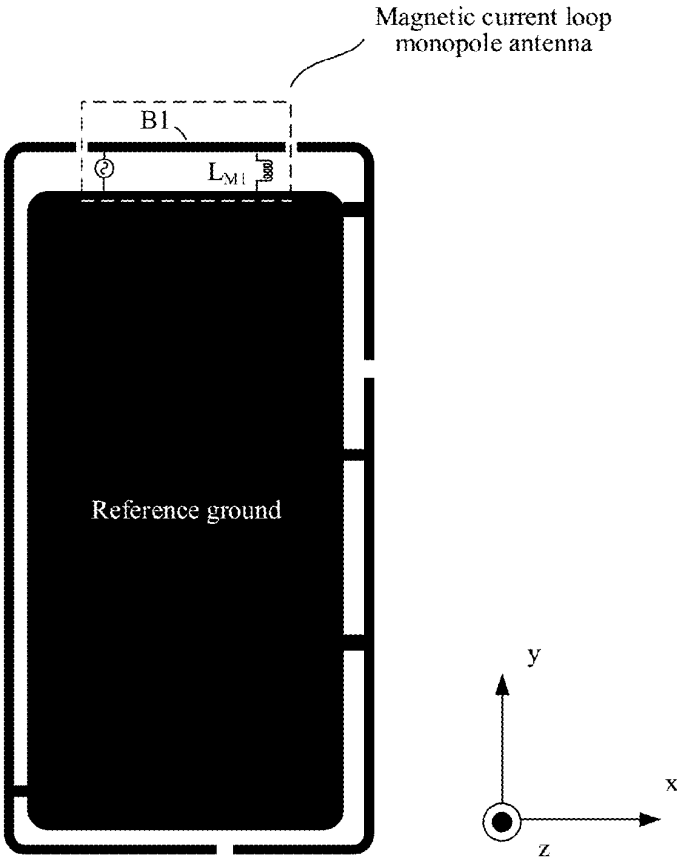
(51) **Int. Cl.**
H01Q 9/42 (2006.01)
H01Q 1/24 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 9/42*** (2013.01); ***H01Q 1/24*** (2013.01)

(57) **ABSTRACT**

Embodiments of this application disclose a terminal monopole antenna, relating to the technical field of antennas. The antenna includes a radiation branch, the radiation branch includes at least one radiator, and a first end of the radiator is electrically connected to a reference ground through a first inductor. When the terminal monopole antenna is directly fed by a feeding point, a second end of the radiator is electrically connected to the feeding point. When the terminal monopole antenna is coupled and fed, the second end is electrically connected to the reference ground through a second inductor. The terminal monopole antenna further includes a feeding branch, the feeding branch is configured to perform coupled feeding to the radiation branch. A length of the radiation branch is less than a quarter of an operating wavelength of the terminal monopole antenna.

Setting illustration of a magnetic current loop monopole antenna in an electronic device



US 20240313412A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0313412 A1**

Ranjbarnikkhah et al. (43) **Pub. Date: Sep. 19, 2024**

(54) **ACTIVE METASURFACES**

(71) Applicant: **Kymeta Corporation**, Redmond, WA (US)

(72) Inventors: **Mohammad Ranjbarnikkhah**, Redmond, WA (US); **Mohammad Mahdi Honari Kalateh**, Redmond, WA (US); **Mohsen Sazegar**, Redmond, WA (US)

(21) Appl. No.: **18/605,089**

(22) Filed: **Mar. 14, 2024**

Related U.S. Application Data

(60) Provisional application No. 63/452,846, filed on Mar. 17, 2023, provisional application No. 63/525,773, filed on Jul. 10, 2023.

Publication Classification

(51) **Int. Cl.**

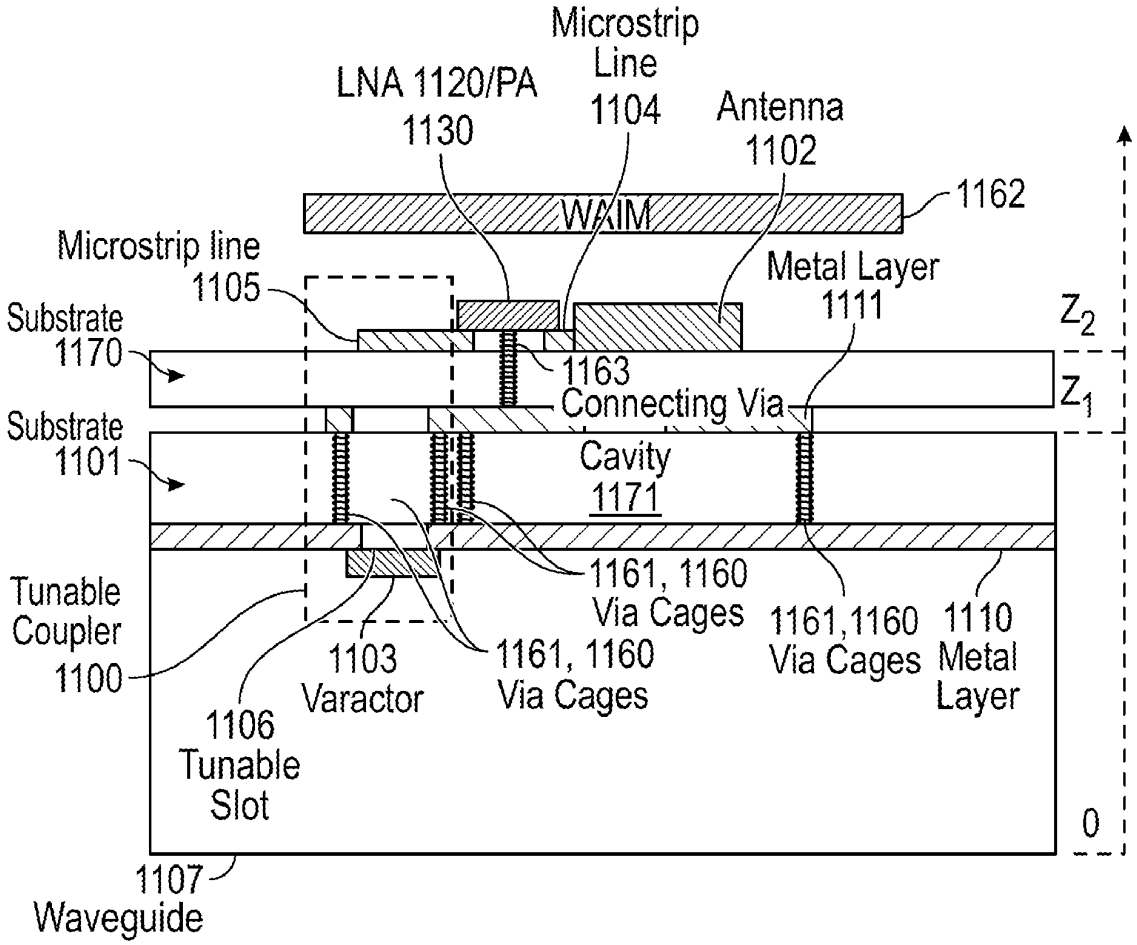
H01Q 13/10	(2006.01)
H01Q 1/22	(2006.01)
H01Q 13/18	(2006.01)
H01Q 23/00	(2006.01)

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

CPC ***H01Q 13/103*** (2013.01); ***H01Q 1/2283*** (2013.01); ***H01Q 13/18*** (2013.01); ***H01Q 23/00*** (2013.01)

(57) **ABSTRACT**

Active metasurface antennas and methods for using the same are disclosed. In some embodiments, the metasurface has a plurality of tunable radiating antenna elements, and each tunable radiating antenna element of the tunable radiating antenna elements comprises a tuning element configured to tune each tunable radiating antenna element and an amplifier coupled in parallel to the tuning element.



US 20240322420A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2024/0322420 A1**

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

KAJIKIYA et al.

(54) **ANTENNA DEVICE AND IC CARD HAVING THE SAME**

(71) Applicant: **TDK Corporation**, Tokyo (JP)

(72) Inventors: **Shoma KAJIKIYA**, Tokyo (JP); **Tomohiro MORIKI**, Tokyo (JP); **Yoshitomo SATO**, Tokyo (JP); **Toshio TOMONARI**, Tokyo (JP)

(21) Appl. No.: **18/608,680**

(22) Filed: **Mar. 18, 2024**

(30) **Foreign Application Priority Data**

Mar. 20, 2023 (JP) 2023-044248
Mar. 20, 2023 (JP) 2023-044249

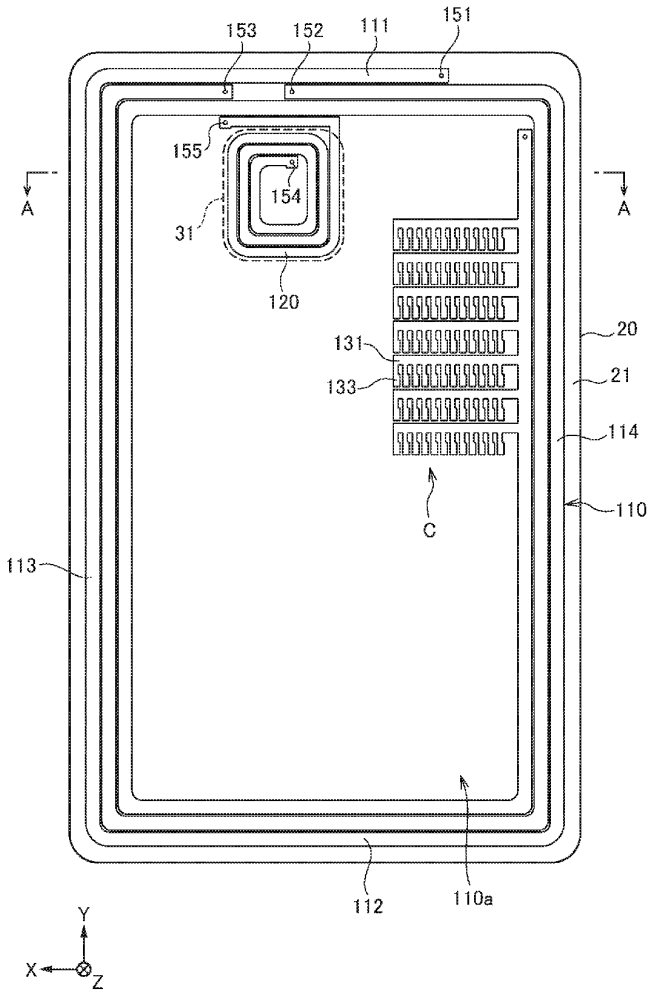
Publication Classification

(51) **Int. Cl.**
H01Q 1/22 (2006.01)
H01Q 7/00 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 1/2283*** (2013.01); ***H01Q 7/005*** (2013.01)

(57) **ABSTRACT**

Disclosed herein is an antenna device that includes a metal plate having a slit, a first coil, and a second coil disposed inside an opening of the first coil and connected to the first coil. The first end of the slit is opened so as to divide an outer edge of the metal plate. The second end of the slit is terminated at a position away from the outer edge of the metal plate by a first distance so as not to divide the outer edge of the first metal plate. The slit includes a first section overlapping the second coil, a second section positioned between the first section and the first end, and a third section positioned between the first section and the second end. The first distance is smaller than a longer one of the second and third sections.



US 20240322430A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0322430 A1**

CHANG (43) **Pub. Date: Sep. 26, 2024**

(54) **MOBILE DEVICE FOR REDUCING SPECIFIC ABSORPTION RATE**

(71) Applicant: **Acer Incorporated**, New Taipei City (TW)

(72) Inventor: **Kun-Sheng CHANG**, New Taipei City (TW)

(21) Appl. No.: **18/330,572**

(22) Filed: **Jun. 7, 2023**

(30) **Foreign Application Priority Data**

Mar. 21, 2023 (TW) 112110337

Publication Classification

(51) **Int. Cl.**

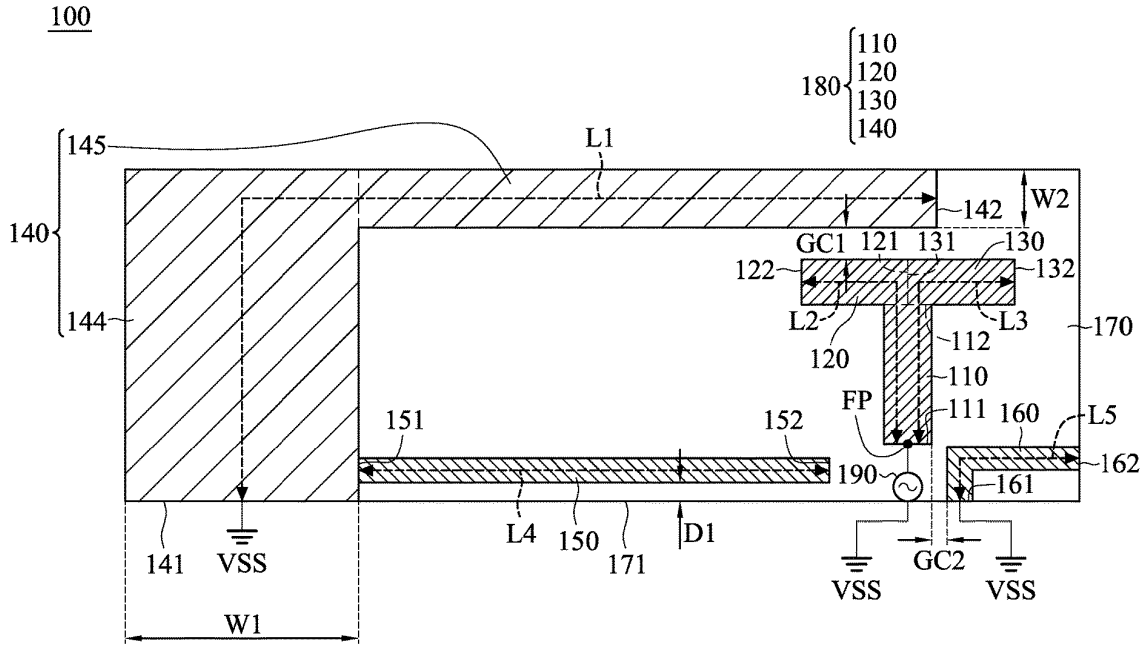
H01Q 5/40	(2006.01)
H01Q 1/48	(2006.01)
H01Q 1/52	(2006.01)

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

CPC ***H01Q 5/40*** (2015.01); ***H01Q 1/48*** (2013.01); ***H01Q 1/52*** (2013.01)

(57) **ABSTRACT**

A mobile device for reducing SAR (Specific Absorption Rate) includes a feeding radiation element, a first radiation element, a second radiation element, a grounding radiation element, a first metal element, a second metal element, and a dielectric substrate. The feeding radiation element has a feeding point. The first radiation element is coupled to the feeding radiation element. The second radiation element is coupled to the feeding radiation element. The second radiation element and the first radiation element substantially extend in opposite directions. The grounding radiation element is coupled to the ground voltage. The first metal element is coupled to the grounding radiation element. The second metal element is coupled to the ground voltage. The second metal element is adjacent to the feeding radiation element. An antenna structure is formed by the feeding radiation element, the first radiation element, the second radiation element, and the grounding radiation element.



US 20240322439A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0322439 A1**

Meng et al. (43) **Pub. Date: Sep. 26, 2024**

(54) **SELF-DECOUPLING WIDEBAND ANTENNA SYSTEM AND TERMINAL DEVICE**

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

(72) Inventors: **Hang Meng**, Shenzhen (CN); **Chao Guo**, Shenzhen (CN); **Yufei Zhang**, Shenzhen (CN); **Xuan Zhai**, Shenzhen (CN); **Hao Guo**, Shenzhen (CN)

(21) Appl. No.: **18/579,020**

(22) PCT Filed: **Aug. 23, 2022**

(86) PCT No.: **PCT/CN2022/114301**

§ 371 (c)(1),
(2) Date: **Jan. 12, 2024**

(30) **Foreign Application Priority Data**

Nov. 30, 2021 (CN) 202111446807.4

Publication Classification

(51) **Int. Cl.**

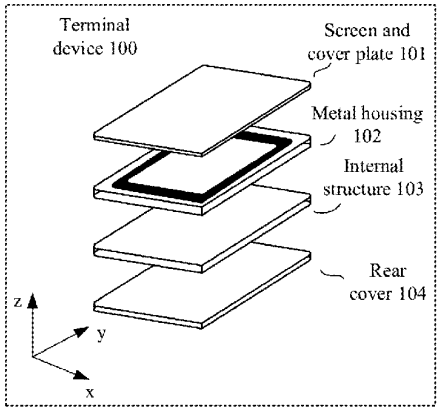
H01Q 9/42	(2006.01)
H01Q 5/378	(2006.01)
H01Q 5/50	(2006.01)
H01Q 21/28	(2006.01)

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

CPC ***H01Q 9/42*** (2013.01); ***H01Q 5/378*** (2015.01); ***H01Q 5/50*** (2015.01); ***H01Q 21/28*** (2013.01)

(57) **ABSTRACT**

A self-decoupling wideband antenna system and a terminal device, including: a first end of a first radiation stub that is connected to a first ground point, and the first radiation stub is further connected to a first feed point; a first end of a second radiation stub and a first end of a third radiation stub are connected to a second ground point, and a slot is provided between a second end of the second radiation stub and a second end of the first radiation stub. A distance between the second end of the second radiation stub and the second end of the first radiation stub is less than a distance between the first end of the second radiation stub and the second end of the first radiation stub.



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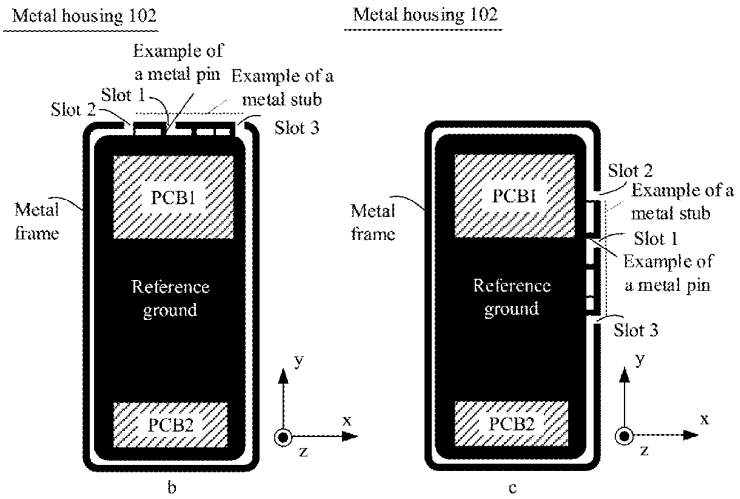

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US 20240322456A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0322456 A1**

Vladimir et al. (43) **Pub. Date: Sep. 26, 2024**

(54) **DUAL-POLARIZED ANTENNA**

(71) Applicant: **Guangzhou Sigtenna Technology Co., Ltd.**, Guangzhou (CN)

(72) Inventors: **Taranenko Vladimir**, Guangzhou (CN); **Zimeng Li**, Guangzhou (CN); **Victor Aleksandrovich Sledkov**, Guangzhou (CN)

(21) Appl. No.: **18/733,833**

(22) Filed: **Jun. 4, 2024**

Related U.S. Application Data

(63) Continuation of application No. PCT/CN2021/137141, filed on Dec. 10, 2021.

(30) **Foreign Application Priority Data**

Dec. 6, 2021 (CN) 202111482267.5

Publication Classification

(51) **Int. Cl.**

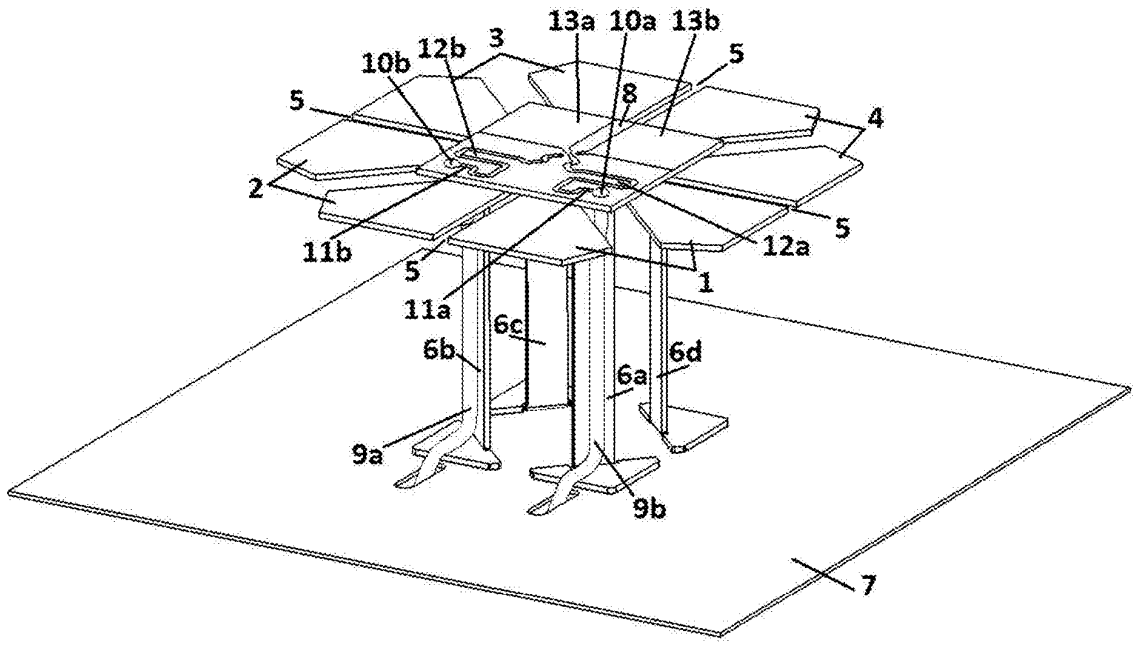
H01Q 21/26 (2006.01)
H01Q 1/50 (2006.01)
H01Q 15/14 (2006.01)
H01Q 25/00 (2006.01)

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

CPC ***H01Q 21/26*** (2013.01); ***H01Q 1/50*** (2013.01); ***H01Q 15/14*** (2013.01); ***H01Q 25/001*** (2013.01)

(57) **ABSTRACT**

A dual-polarized antenna, including a radiating unit containing four conductive elements, four support elements, a feeding unit and a reflective plate, in which the four conductive elements are separated from each other by a cruciform slit at a middle of the radiating unit, top ends of the four support elements are connected to the conductive elements, and bottom ends of the four support elements are fixed on the reflective plate. The feeding element contains a PCB disposed at a middle of the radiating unit on top surfaces of the conductive elements and two coaxial cables disposed along the supporting elements and connected by its output conductors to a conductive layer covering a bottom surface of the PCB and connected by its input conductors to first ends of two strip lines disposed on a top surface of the PCB and forming two circuits matching the radiating unit with two coaxial cables.



US 20240322847A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2024/0322847 A1

(43) Pub. Date: Sep. 26, 2024

KIM

(54) **ELECTRONIC DEVICE FOR CONTROLLING SWITCH ELECTRICALLY CONNECTED TO ANTENNA AND OPERATION METHOD FOR ELECTRONIC DEVICE**

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

(72) Inventor: **Kyoungtae KIM**, Suwon-si (KR)

(21) Appl. No.: **18/627,114**

(22) Filed: **Apr. 4, 2024**

Related U.S. Application Data

(63) Continuation of application No. PCT/KR2024/003412, filed on Mar. 19, 2024.

(30) **Foreign Application Priority Data**

Mar. 24, 2023 (KR) 10-2023-0038487
Apr. 7, 2023 (KR) 10-2023-0046356

Publication Classification

(51) **Int. Cl.**

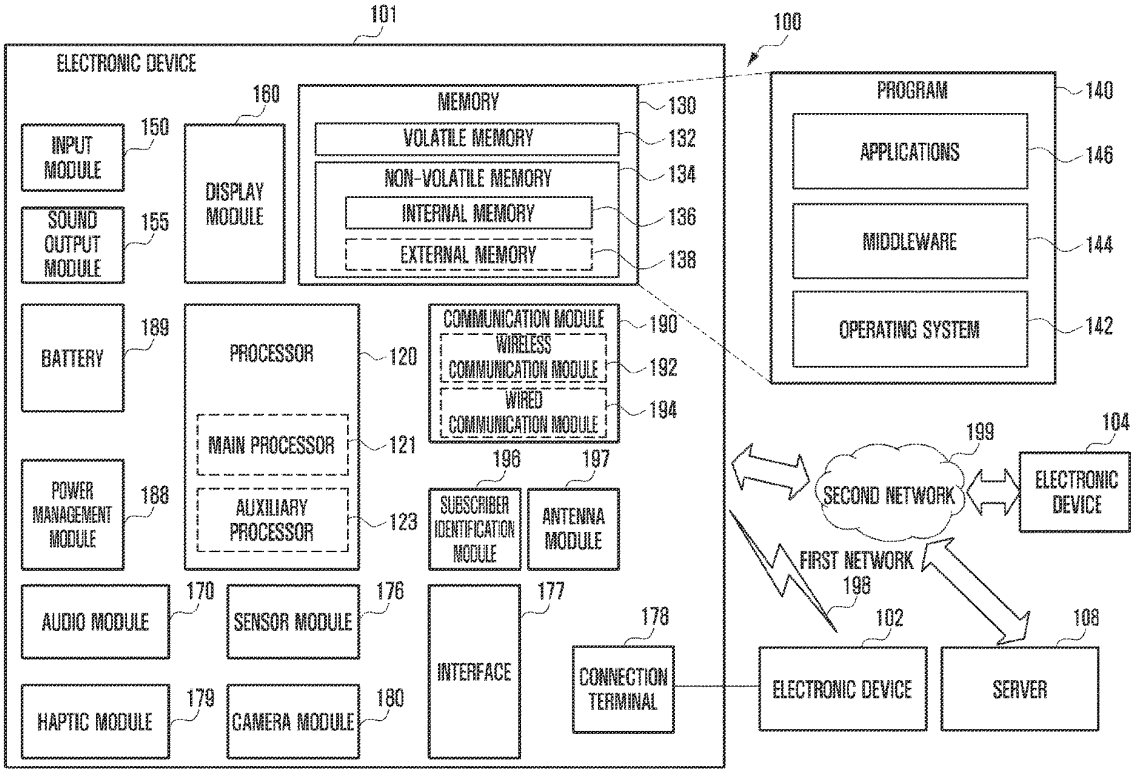
H04B 1/00	(2006.01)
H01Q 3/24	(2006.01)
H04B 7/06	(2006.01)
H04B 7/08	(2006.01)

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

CPC ***H04B 1/0064*** (2013.01); ***H01Q 3/24*** (2013.01); *H04B 7/0602* (2013.01); *H04B 7/0805* (2013.01)

(57) **ABSTRACT**

In an electronic device and a method of operating an electronic device according to various embodiments, the electronic device may include an antenna. The electronic device may include at least one electronic component. The electronic device may include a switch configured to electrically connect the antenna and at least one of a first path connected to a first ground disposed on one layer of multiple layers of a printed circuit board and a second path connected to a second ground disposed on another layer of the multiple layers. The electronic device may include at least one communication processor, comprising processing circuitry, electrically connected to the switch. At least one communication processor, individually and/or collectively, may output a signal through the antenna in a first state in which the antenna is electrically connected to the first path; control, based on the at least one component being activated, the switch so that the switch is converted from the first state to a second state in which the antenna is electrically connected to the second path; and based on a specified time elapsing, control the switch so that the switch is converted from the second state to the first state.



US 20240332787A1

(19) **United States**

(12) **Patent Application Publication**

HSIAO et al.

(10) **Pub. No.: US 2024/0332787 A1**

(43) **Pub. Date: Oct. 3, 2024**

(54) **MULTIBAND PRINTED ANTENNA**

(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.: **18/404,882**

(22) Filed: **Jan. 4, 2024**

(30) **Foreign Application Priority Data**

Mar. 30, 2023 (CN) 202320660804.9

Publication Classification

(51) **Int. Cl.**

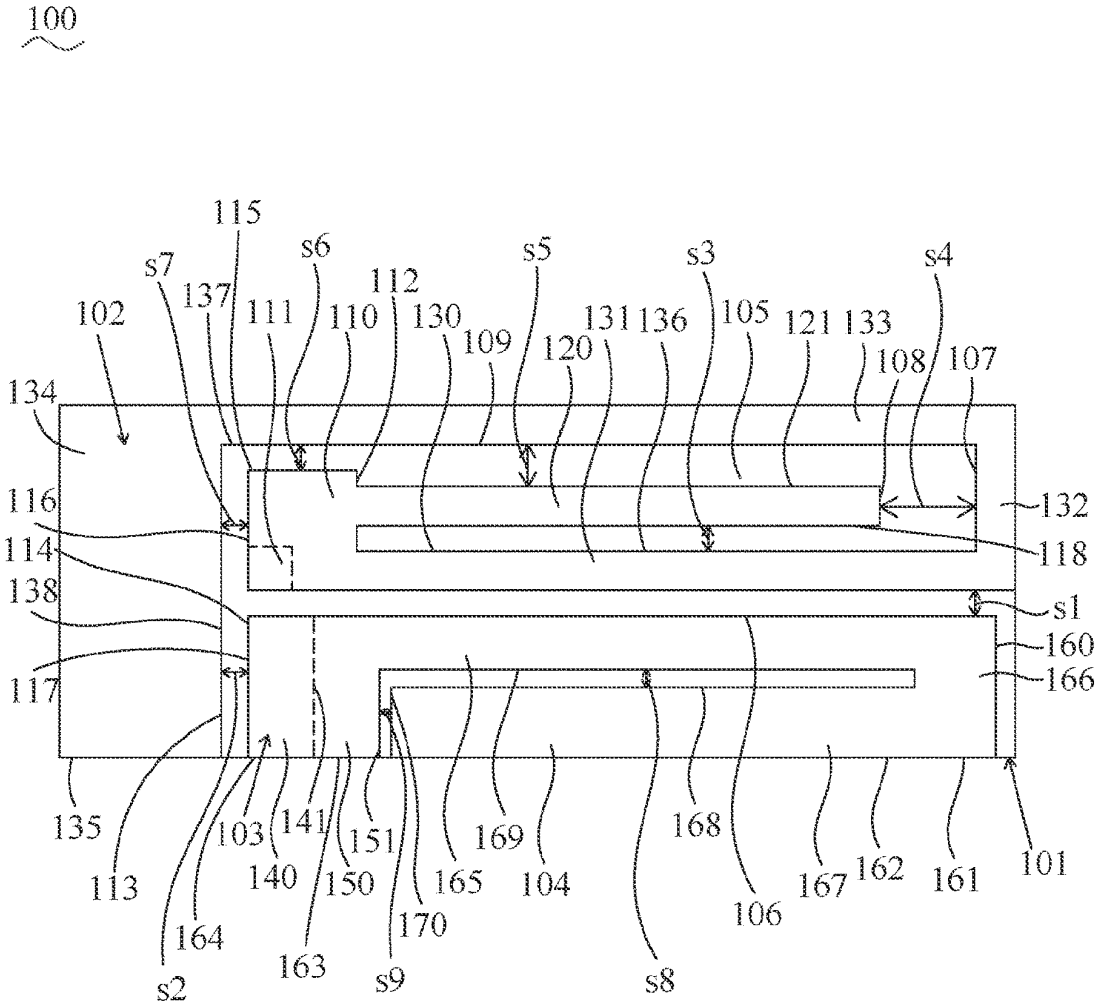
H01Q 1/38	(2006.01)
H01Q 1/24	(2006.01)
H01Q 1/48	(2006.01)
H01Q 5/25	(2006.01)
H01Q 5/321	(2006.01)

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

CPC ***H01Q 1/38*** (2013.01); ***H01Q 1/243*** (2013.01); ***H01Q 1/48*** (2013.01); ***H01Q 5/25*** (2015.01); ***H01Q 5/321*** (2015.01)

(57) **ABSTRACT**

A multiband printed antenna includes a radiator arranged on an upper portion and one end of a circuit board, and a grounding body. The radiator includes a feed-in part, a first radiation part straightly extended rightward from an upper section of a first right edge of the feed-in part, and a second radiation part sequentially extended rightward, then extended upward, later extended leftward, and further extended downward from a lower section of the first right edge of the feed-in part. The grounding body is arranged on a lower portion of the circuit board. The grounding body is positioned adjacent to a lower portion of a second right edge of the radiator. The grounding body is separated from the radiator.



US 20240332801A1

(19) **United States**

(12) **Patent Application Publication**

HSIAO et al.

(10) **Pub. No.: US 2024/0332801 A1**

(43) **Pub. Date: Oct. 3, 2024**

(54) **MULTIBAND PRINTED ANTENNA**

(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.: **18/404,879**

(22) Filed: **Jan. 4, 2024**

(30) **Foreign Application Priority Data**

Mar. 28, 2023 (CN) 202320631225.1

Publication Classification

(51) **Int. Cl.**

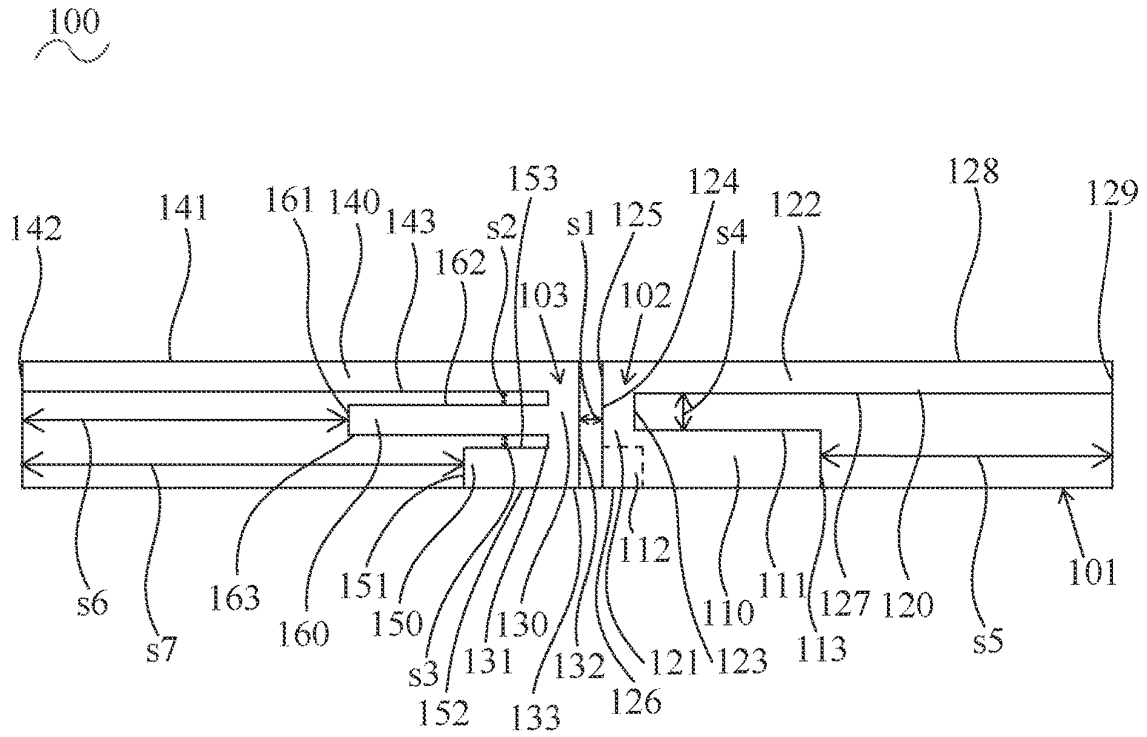
H01Q 9/04 (2006.01)
H01Q 1/24 (2006.01)
H01Q 1/48 (2006.01)

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

CPC ***H01Q 9/0414*** (2013.01); ***H01Q 1/243*** (2013.01); ***H01Q 1/48*** (2013.01)

(57) **ABSTRACT**

A multiband printed antenna includes a radiation unit and a grounding unit. The radiation unit is arranged at a right of a circuit board. The radiation unit includes a first radiation part, and a second radiation part which is extended upward and then is bent rightward from a left of a top edge of the first radiation part. The grounding unit is arranged at a left of the circuit board. The grounding unit is separated from the radiation unit. The grounding unit includes a first extension, a second extension straightly extended leftward from a top of a first left edge of the first extension, a grounding part straightly extended leftward from a bottom of the first left edge of the first extension, and a third extension straightly extended leftward from a middle of the first left edge of the first extension.



US 20240332803A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2024/0332803 A1**

(43) **Pub. Date: Oct. 3, 2024**

HSIAO et al.

(54) **MULTIBAND PRINTED ANTENNA**

(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.: **18/395,458**

(22) Filed: **Dec. 22, 2023**

(30) **Foreign Application Priority Data**

Mar. 28, 2023 (CN) 202320630820.3

Publication Classification

(51) **Int. Cl.**

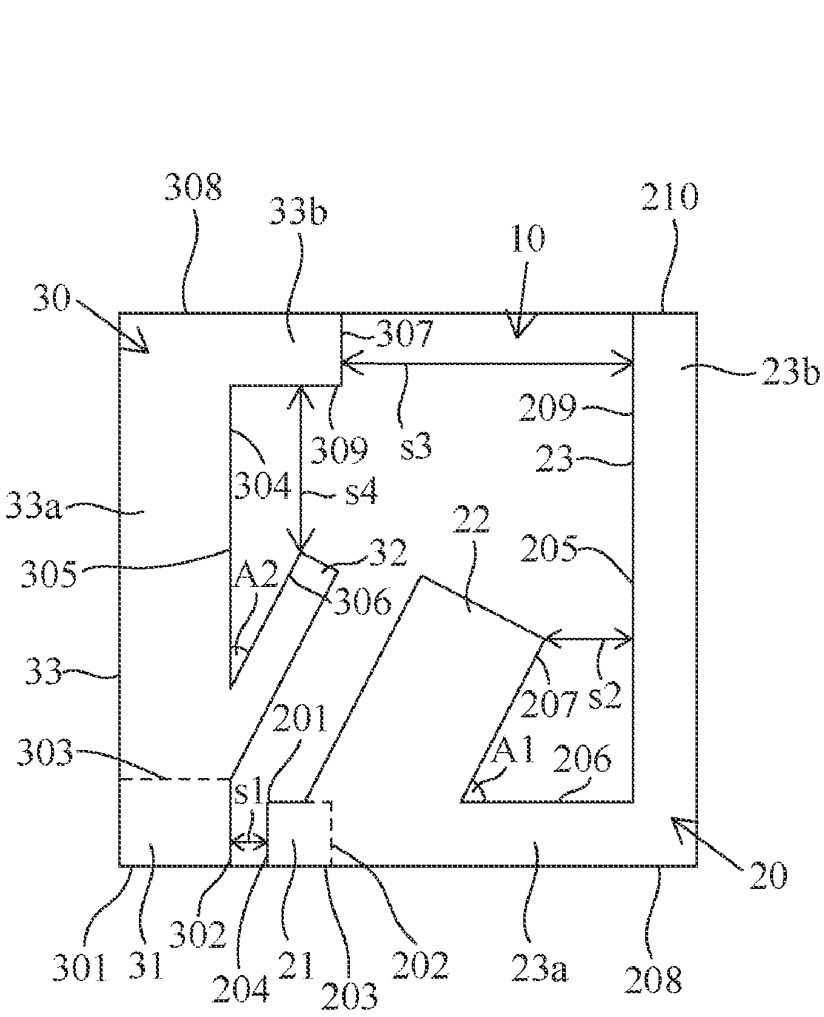
H01Q 9/04	(2006.01)
H01Q 1/48	(2006.01)
H01Q 5/307	(2006.01)

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

CPC ***H01Q 9/0421*** (2013.01); ***H01Q 1/48*** (2013.01); ***H01Q 5/307*** (2015.01)

(57) **ABSTRACT**

A multiband printed antenna includes a circuit board, a radiator unit and a grounding unit. The radiator unit is arranged on the circuit board. The radiator unit includes a feed-in portion, a first radiant portion slantwise extended upward and rightward from a right of a first top edge of the feed-in portion, and a second radiant portion extended rightward and then extended upward from a first right edge of the feed-in portion. The first radiant portion is formed in a strip shape. The second radiant portion is formed in a lying L shape. A first inner edge of the second radiant portion is separated from a top end of the first radiant portion. The grounding unit is arranged on the circuit board. The radiator unit and the grounding unit are separated from each other.



US 20240332819A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2024/0332819 A1

KIM et al. (43) Pub. Date: Oct. 3, 2024

(54) **ELECTRONIC DEVICE INCLUDING ANTENNA**

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

(72) Inventors: **Dongyeon KIM**, Suwon-si (KR); **Hosaeng KIM**, Suwon-si (KR)

(21) Appl. No.: **17/846,576**

(22) Filed: **Jun. 22, 2022**

Related U.S. Application Data

(63) Continuation of application No. PCT/KR2022/007891, filed on Jun. 3, 2022.

(30) **Foreign Application Priority Data**

Jun. 3, 2021 (KR) 10-2021-0072081

Publication Classification

(51) **Int. Cl.**

H01Q 21/06	(2006.01)
H01Q 1/24	(2006.01)
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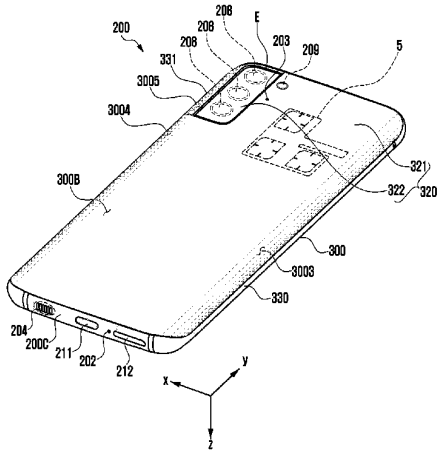
H01Q 9/04	(2006.01)
H01Q 21/24	(2006.01)

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

CPC ***H01Q 21/065*** (2013.01); ***H01Q 5/25*** (2015.01); ***H01Q 9/0428*** (2013.01); ***H01Q 21/24*** (2013.01); *H01Q 1/243* (2013.01)

(57) **ABSTRACT**

According to an embodiment of the present disclosure, an electronic device may include: a housing; an antenna structure positioned in the housing and including a printed circuit board, multiple first antenna elements, multiple second antenna elements, and multiple electrical paths; and a wireless communication circuit electrically connected to the multiple first antenna elements through the electrical paths, wherein: the printed circuit board includes a first surface oriented in a first direction and a second surface oriented in a second direction opposite to the first direction; the multiple first antenna elements are positioned in the printed circuit board on the first surface or to be closer to the first surface than the second surface, configured to generate circular polarization, and include, when seen from above the first surface, a first border and a third border spaced apart from each other and extending in parallel to each other, a second border and a fourth border spaced apart from each other by a distance between the first border and the third border, extending in parallel to each other, and disposed to be perpendicular to the first border or the third border, and multiple first notches formed on the first border, the second border, the third border, and the fourth border and arranged at a 90-degree angle with reference to a center of each of the multiple first antenna elements; the multiple second antenna elements are positioned in the printed circuit board to be closer to the second surface than the multiple first antenna elements, overlap with, when seen from above the first surface, the multiple first antenna elements one-to-one, configured to generate circular polarization, and include, when seen from above the first surface, a fifth border and a seventh border spaced apart from each other and extending in parallel to each other, a sixth border and an eighth border spaced apart from each other by a distance between the fifth border and the seventh border, and disposed to be perpendicular to the fifth border or the seventh border, and multiple second notches formed on the fifth border, the sixth border, the seventh border, and the eighth border, arranged at a 90-degree angle with reference to the center, and overlapping with at least some of the multiple first notches one-to-one; and the multiple electrical paths are positioned on the printed circuit board and include multiple conductive vias electrically connected to the multiple first antenna elements; the printed circuit board includes a first conductive layer including the multiple first antenna elements, a second conductive layer including the multiple second antenna elements, a first dielectric positioned between the first conductive layer and the second conductive layer, a third conductive layer configured to electrically connect the multiple conductive vias to the wireless communication circuit and positioned in the printed circuit board to be closer to the second surface than the second conductive layer, a fourth conductive layer including a ground plane and positioned in the printed circuit board to be closer to the second surface than the third conductive layer, and a second dielectric positioned between the third conductive layer and the fourth conductive layer and having a greater dielectric constant than the first dielectric; each of the multiple second antenna elements includes a hole; each of the multiple conductive vias is positioned to extend through the hole; the multiple second antenna elements are configured to be indirectly fed by the multiple conductive vias; and the multiple first notches have different shapes from the multiple second notches.



US 20240333331A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2024/0333331 A1**

(43) **Pub. Date: Oct. 3, 2024**

KIM et al.

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

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

(72) Inventors: **Jaehyung KIM**, Suwon-si (KR); **Cheolhong SON**, Suwon-si (KR); **Seunghwan KIM**, Suwon-si (KR); **Jaebong CHUN**, Suwon-si (KR)

(21) Appl. No.: **18/657,181**

(22) Filed: **May 7, 2024**

Related U.S. Application Data

(63) Continuation of application No. PCT/KR2024/003717, filed on Mar. 25, 2024.

(30) **Foreign Application Priority Data**

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Apr. 19, 2023 (KR) 10-2023-0051219

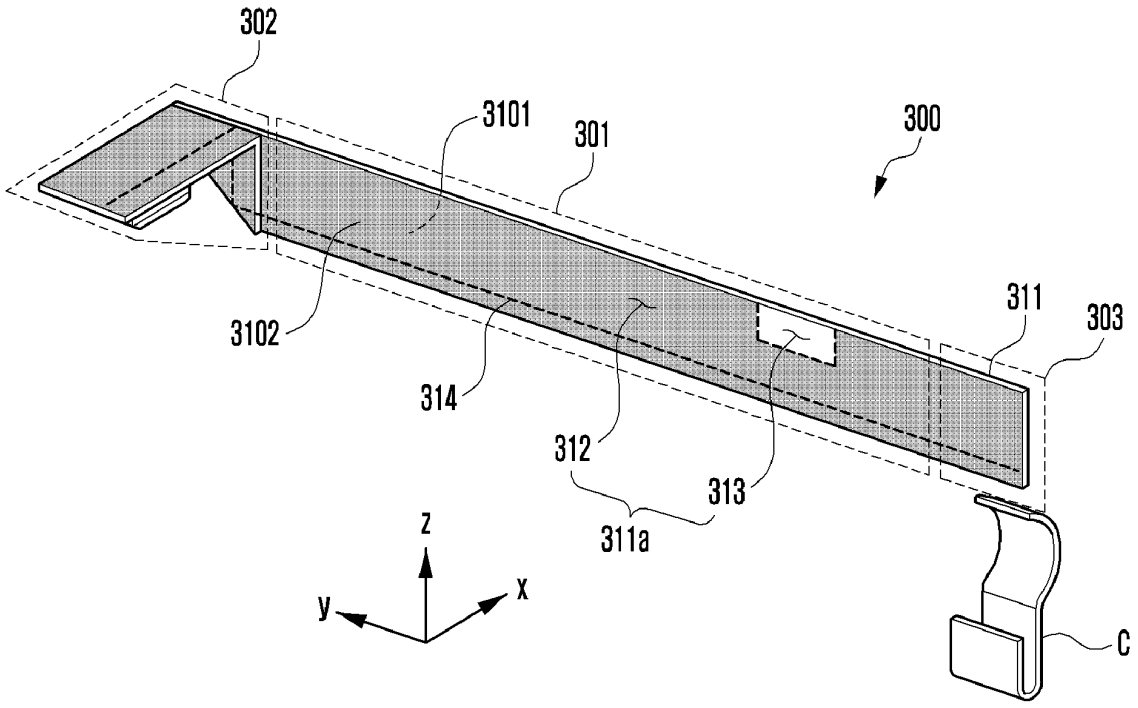
Publication Classification

(51) **Int. Cl.**
H04B 1/40 (2006.01)
H01Q 1/24 (2006.01)
H01Q 5/50 (2006.01)

(52) **U.S. Cl.**
CPC ***H04B 1/40*** (2013.01); ***H01Q 5/50*** (2015.01); *H01Q 1/241* (2013.01)

(57) **ABSTRACT**

According to various embodiments, an electronic device may include: a housing comprising a conductive portion and non-conductive portion forming a portion of an exterior side surface, a circuit board disposed in the housing, a communication circuit disposed on the circuit board, and a connection circuit board electrically connecting the communication circuit to the conductive portion, wherein the connection circuit board may comprise a first layer including a conductive area and a non-conductive area, the non-conductive area being located within a proximity of the non-conductive portion, and the communication circuit may be configured to transmit or receive signals via the conductive portion.



US 20240339748A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0339748 A1**

Wang et al. (43) **Pub. Date: Oct. 10, 2024**

(54) **COMPACT HIGH-PERFORMANCE DUAL-POLARIZED QUASI-OMNIDIRECTIONAL MIMO ANTENNA APPARATUS FOR 3G/4G/5G SMALL-CELL APPLICATIONS**

(71) Applicant: **Norsat International Inc.**, Richmond (CA)

(72) Inventors: **Dong Wang**, Waterloo (CA); **Yazi Cao**, Newmarket (CA); **Tong Li**, Aurora (CA)

(73) Assignee: **Norsat International Inc.**, Richmond (CA)

(21) Appl. No.: **18/130,842**

(22) Filed: **Apr. 4, 2023**

Publication Classification

(51) **Int. Cl.**

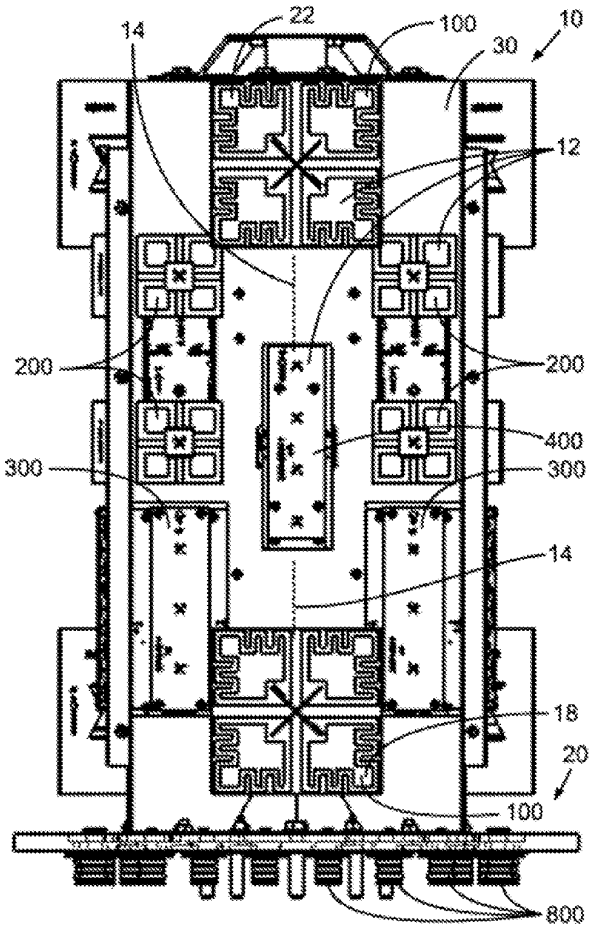
H01Q 1/24	(2006.01)
H01Q 9/16	(2006.01)
H01Q 21/24	(2006.01)

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

CPC ***H01Q 1/246*** (2013.01); ***H01Q 9/16*** (2013.01); ***H01Q 21/24*** (2013.01)

(57) **ABSTRACT**

The present invention relates to the field of wireless telecommunication and discloses a compact, high-performance, dual-polarized, quasi-omnidirectional Multiple-Input Multiple-Output (MIMO) antenna system for small cell wireless communications. It develops a flexible platform to realize different arrangements of antenna modules for different applications for 3G, 4G, and 5G wireless systems. It includes multi-band dual-polarized antenna arrays operating at 696 MHz-960 MHz, 1695 MHz-2700 MHz, 3300 MHz-4200 MHZ, 5150 MHz-5925 MHz, high gain antenna array modules, feeding networks, power dividers, reflectors, and a radome. The invention adopts a dual-polarized MIMO antenna structure with multiple radiating antenna arrays with high isolation between radiating elements to achieve compact size, good standing wave ratio, high gain, wide operating frequency range, quasi-omnidirectional antenna pattern, and spatial diversity with less interference. In addition, the antenna structure is fully customizable, highly reliable and durable, easy to manufacture, and easy to deploy in the field.



US 20240339756A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0339756 A1**

LI et al. (43) **Pub. Date: Oct. 10, 2024**

(54) **PLANAR TRANSPARENT ANTENNA STRUCTURE**

(71) Applicant: **INDUSTRIAL TECHNOLOGY RESEARCH INSTITUTE**, Hsinchu (TW)

(72) Inventors: **Bing-Syun LI**, Hsinchu City (TW); **Li-Yang TSAI**, Luodong Township (TW); **Kuang-Hui SHIH**, Tainan City (TW); **Ruo-Lan CHANG**, New Taipei City (TW); **Wei-Chung CHEN**, Zhunan Township (TW)

(73) Assignee: **INDUSTRIAL TECHNOLOGY RESEARCH INSTITUTE**, Hsinchu (TW)

(21) Appl. No.: **18/624,623**

(22) Filed: **Apr. 2, 2024**

Related U.S. Application Data

(60) Provisional application No. 63/457,425, filed on Apr. 6, 2023.

(30) **Foreign Application Priority Data**

Jan. 24, 2024 (TW) 113102790

Publication Classification

(51) **Int. Cl.**

H01Q 9/04 (2006.01)

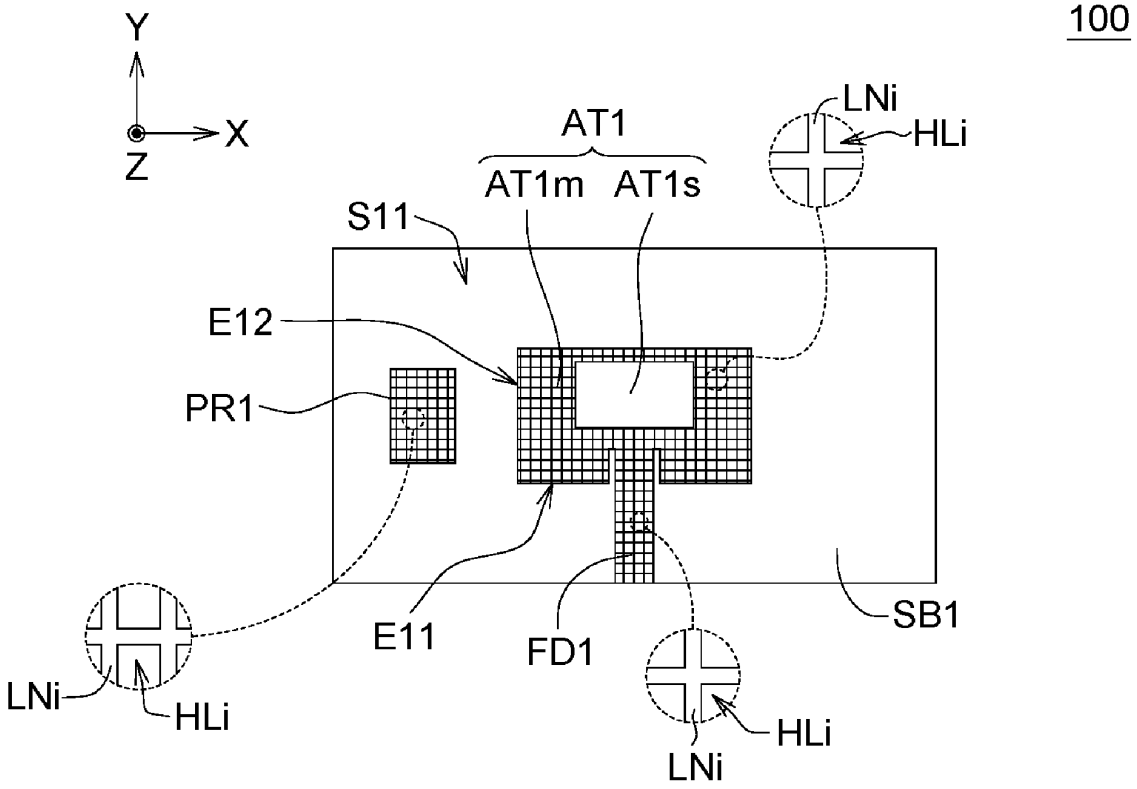
H01Q 19/00 (2006.01)

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

CPC ***H01Q 9/0464*** (2013.01); ***H01Q 19/005*** (2013.01)

(57) **ABSTRACT**

A planar transparent antenna structure is provided. The planar transparent antenna structure includes a dielectric substrate, a radiation patch conductive layer, a parasitic patch conductive layer and a ground conductive layer. The radiation patch conductive layer is disposed on the dielectric substrate. The radiation patch conductive layer is a ring structure. The parasitic patch conductive layer is disposed on the dielectric substrate. The ground conductive layer is disposed on the dielectric substrate. The radiation patch conductive layer, the parasitic patch conductive layer and the ground conductive layer are composed of a plurality of wires interconnected and connected with each other and are light-transmissive.



US 20240347891A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2024/0347891 A1**

(43) **Pub. Date: Oct. 17, 2024**

Neenan et al.

(54) **ANTENNA SYSTEM**

(71) Applicant: **Parsec Technologies, Inc.**, Plano, TX (US)

(72) Inventors: **Michael A. Neenan**, Plano, TX (US); **Richard Loy Smith, JR.**, Dallas, TX (US); **George Alexander Bednekoff**, Plano, TX (US)

(21) Appl. No.: **18/412,270**

(22) Filed: **Jan. 12, 2024**

Related U.S. Application Data

(63) Continuation of application No. 17/712,000, filed on Apr. 1, 2022, now Pat. No. 11,909,090, which is a continuation-in-part of application No. 17/699,578, filed on Mar. 21, 2022, now Pat. No. 11,658,382, which is a continuation of application No. 16/588,732, filed on Sep. 30, 2019, now Pat. No. 11,283,149.

Publication Classification

(51) **Int. Cl.**

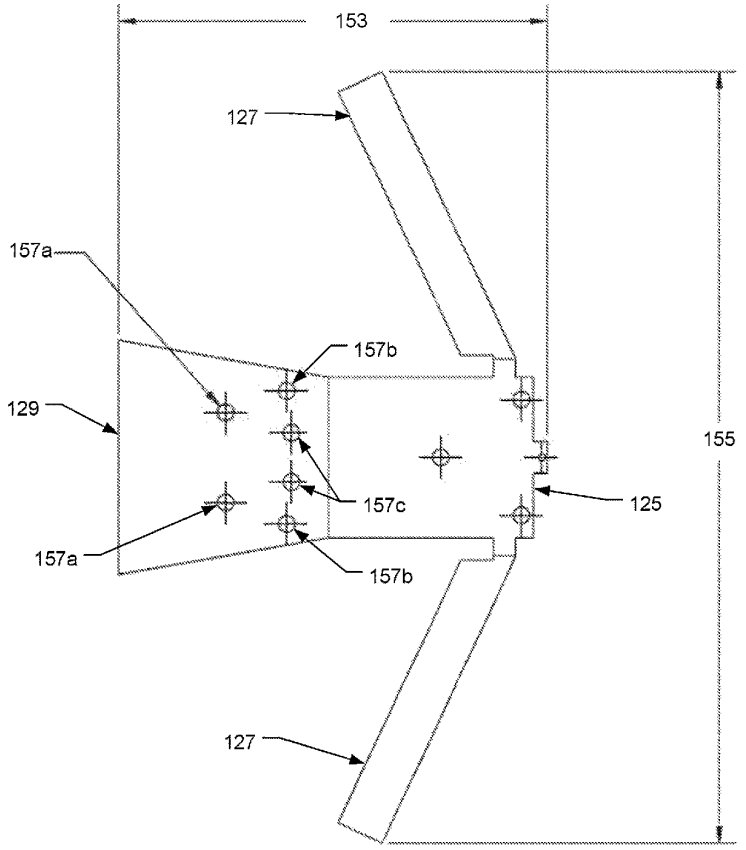
H01Q 1/08	(2006.01)
H01Q 1/12	(2006.01)
H01Q 1/24	(2006.01)
H01Q 5/30	(2006.01)
H01Q 9/04	(2006.01)
H01Q 9/16	(2006.01)
H01Q 11/10	(2006.01)

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

CPC ***H01Q 1/08*** (2013.01); ***H01Q 1/243*** (2013.01); *H01Q 1/1235* (2013.01); *H01Q 1/125* (2013.01); *H01Q 5/30* (2015.01); *H01Q 9/0421* (2013.01); *H01Q 9/045* (2013.01); *H01Q 9/16* (2013.01); *H01Q 11/10* (2013.01)

(57) **ABSTRACT**

A multi-band antenna has a feed point, a grounding location, a first portion for low band operation, a second portion for low band operation, and one or more portions for high band operation. The ground reference of the feed point for the multi-band antenna is connected to a separate object that may provide a base for the multi-band antenna. The feed point of the multi-band antenna may be spaced above the base and have a space between the feed point and a location for the ground point. The low band portion has multiple resonances that are often odd multiples of the lowest resonant response. The portions that resonant most dominantly in the high band often have multiple resonances that are even multiples of the lowest high band resonance. The multi-band antenna has resonances spaced closely enough to appear to be a wide band antenna above the fundamental high band resonance.



US 20240347903A1

(19) **United States**

(12) **Patent Application Publication**

Xue et al.

(10) **Pub. No.: US 2024/0347903 A1**

(43) **Pub. Date: Oct. 17, 2024**

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

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

(72) Inventors: **Liang Xue**, Shanghai (CN); **Yiwen Gong**, Shanghai (CN); **Wei Wu**, Shanghai (CN); **Jiaming Wang**, Shanghai (CN); **Fangchao Zhao**, Shanghai (CN)

(21) Appl. No.: **18/579,689**

(22) PCT Filed: **Jul. 14, 2022**

(86) PCT No.: **PCT/CN2022/105631**

§ 371 (c)(1),
(2) Date: **Jan. 16, 2024**

(30) **Foreign Application Priority Data**

Jul. 16, 2021 (CN) 202110810416.X

Publication Classification

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H01Q 1/24	(2006.01)
H01Q 1/48	(2006.01)
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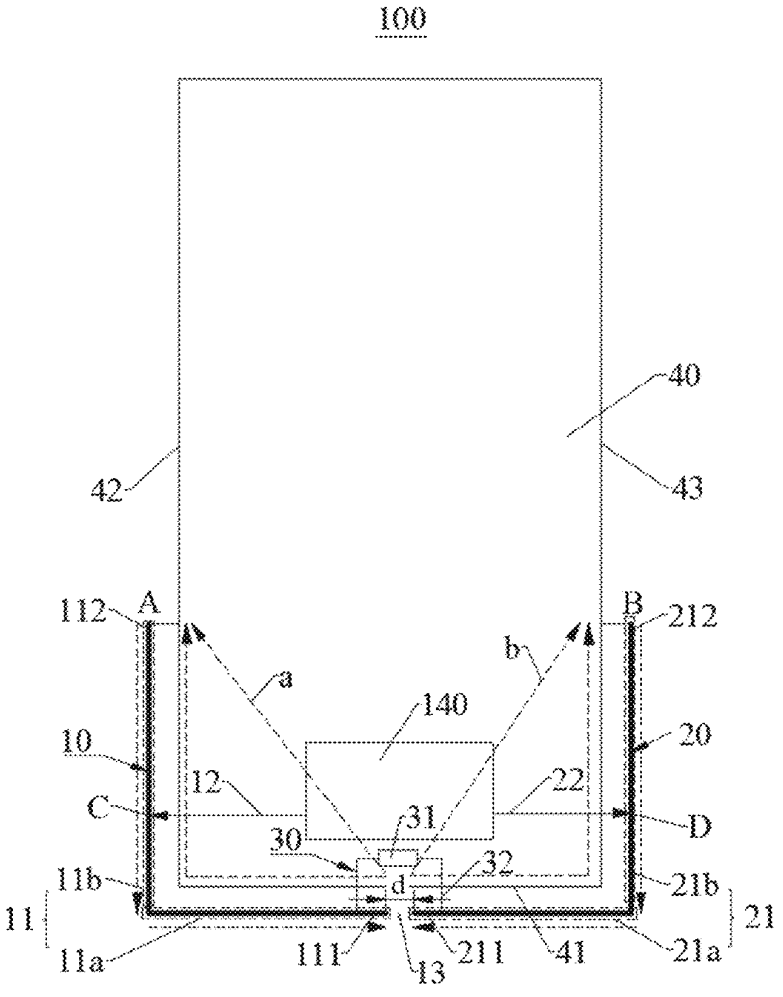
H01Q 25/04	(2006.01)

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

CPC ***H01Q 1/521*** (2013.01); ***H01Q 1/243*** (2013.01); ***H01Q 1/48*** (2013.01); ***H01Q 9/42*** (2013.01); ***H01Q 25/04*** (2013.01)

(57) **ABSTRACT**

An antenna structure includes a first radiator and a second radiator, and a first open end of the first radiator is opposite to and spaced from a second open end of the second radiator. A decoupling circuit is connected between the first open end and the second open end. The first radiator includes a first section and a second section that intersect, and the first section and the second section are respectively located on two adjacent sides of a ground.



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(19) **United States**

(12) **Patent Application Publication**

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(43) **Pub. Date: Oct. 17, 2024**

LIU et al.

(54) **ANTENNA AND ELECTRONIC DEVICE**

(71) Applicant: **BOE Technology Group Co., Ltd.**, Beijing (CN)

(72) Inventors: **Jianxing LIU**, Beijing (CN); **Shiyu ZHANG**, Beijing (CN); **Zhuofan JIAO**, Beijing (CN); **Mengxia YU**, Beijing (CN); **Jianyun ZHAO**, Beijing (CN)

(21) Appl. No.: **18/637,292**

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Related U.S. Application Data

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Publication Classification

(51) **Int. Cl.**

H01Q 3/34 (2006.01)

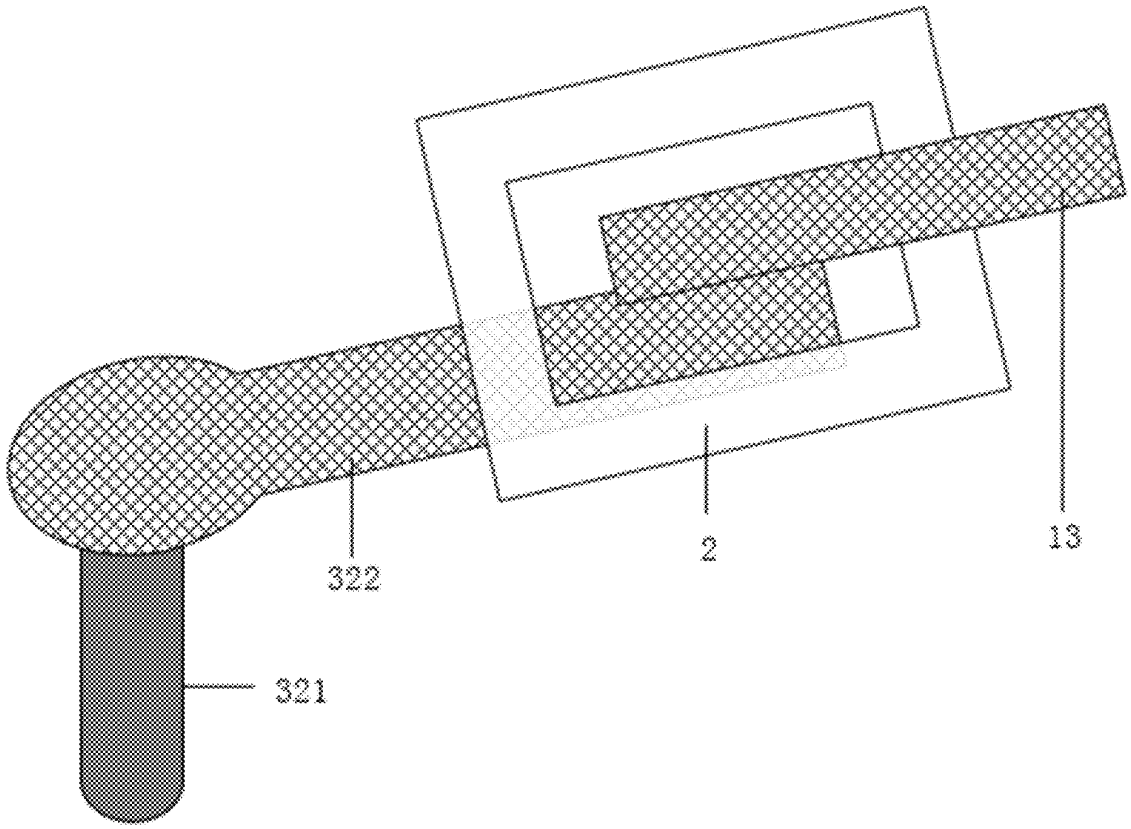
H01Q 1/42 (2006.01)

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

CPC ***H01Q 3/34*** (2013.01); ***H01Q 1/422*** (2013.01)

(57) **ABSTRACT**

Provided is an antenna. The antenna includes: at least one phase-shifting structure, a first reference electrode layer, and a feed substrate; wherein each of the at least one phase-shifting structure includes a first dielectric substrate, a second dielectric substrate, a first electrode layer, a second electrode layer, and a tunable dielectric layer; a first via is defined in the first reference electrode layer; the feed substrate includes a first dielectric layer and a feed structure, and a second via is defined in the first dielectric layer; and the antenna further includes a conductive member, wherein the feed structure includes a main circuit and at least one branch circuit, one of the at least one branch circuit is electrically connected to the conductive member, the conductive member is electrically connected to the first electrode layer through the first via, the second via, and a third via.



US 20240347910A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0347910 A1**

CHANG et al. (43) **Pub. Date: Oct. 17, 2024**

(54) **MOBILE DEVICE SUPPORTING WIDEBAND OPERATION**

(71) Applicant: **Acer Incorporated**, New Taipei City (TW)

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

(21) Appl. No.: **18/347,262**

(22) Filed: **Jul. 5, 2023**

(30) **Foreign Application Priority Data**

Apr. 13, 2023 (TW) 112113793

Publication Classification

(51) **Int. Cl.**

H01Q 5/35 (2006.01)

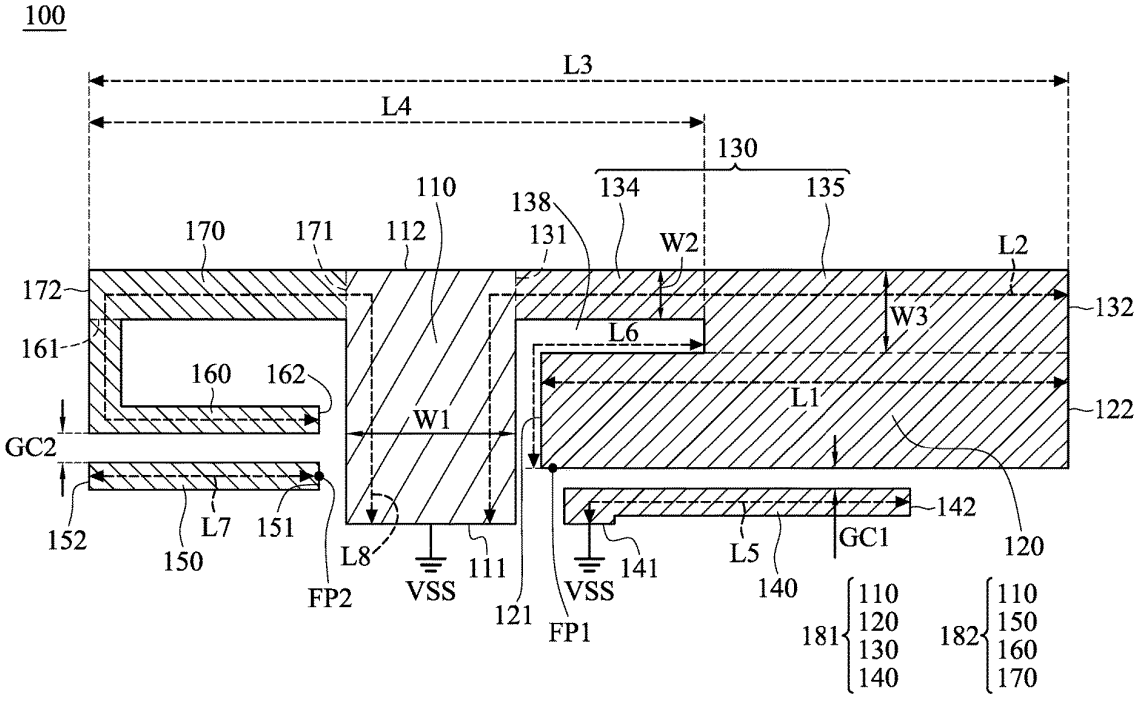
H01Q 5/50 (2006.01)

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

CPC ***H01Q 5/35*** (2015.01); ***H01Q 5/50*** (2015.01)

(57) **ABSTRACT**

A mobile device supporting wideband operations includes a grounding radiation element, a first radiation element, a second radiation element, a third radiation element, a fourth radiation element, a fifth radiation element, and a sixth radiation element. The first radiation element has a first feeding point. The first radiation element is coupled through the second radiation element to the grounding radiation element. The fourth radiation element has a second feeding point. The fifth radiation element is adjacent to the fourth radiation element. The fifth radiation element is coupled through the sixth radiation element to the grounding radiation element. A first antenna structure is formed by the grounding radiation element, the first radiation element, the second radiation element, and the third radiation element. A second antenna structure is formed by the grounding radiation element, the fourth radiation element, the fifth radiation element, and the sixth radiation element.



US 20240347914A1

(19) **United States**

(12) **Patent Application Publication**

WANG et al.

(10) **Pub. No.: US 2024/0347914 A1**

(43) **Pub. Date: Oct. 17, 2024**

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

(71) Applicants: **Beijing BOE Technology Development Co., Ltd.**, Beijing (CN); **BOE Technology Group Co., Ltd.**, Beijing (CN)

(72) Inventors: **Yali WANG**, Beijing (CN); **Xichao FAN**, Beijing (CN)

(73) Assignees: **Beijing BOE Technology Development Co., Ltd.**, Beijing (CN); **BOE Technology Group Co., Ltd.**, Beijing (CN)

(21) Appl. No.: **18/636,551**

(22) Filed: **Apr. 16, 2024**

Related U.S. Application Data

(63) Continuation of application No. PCT/CN2023/088484, filed on Apr. 14, 2023.

Publication Classification

(51) **Int. Cl.**

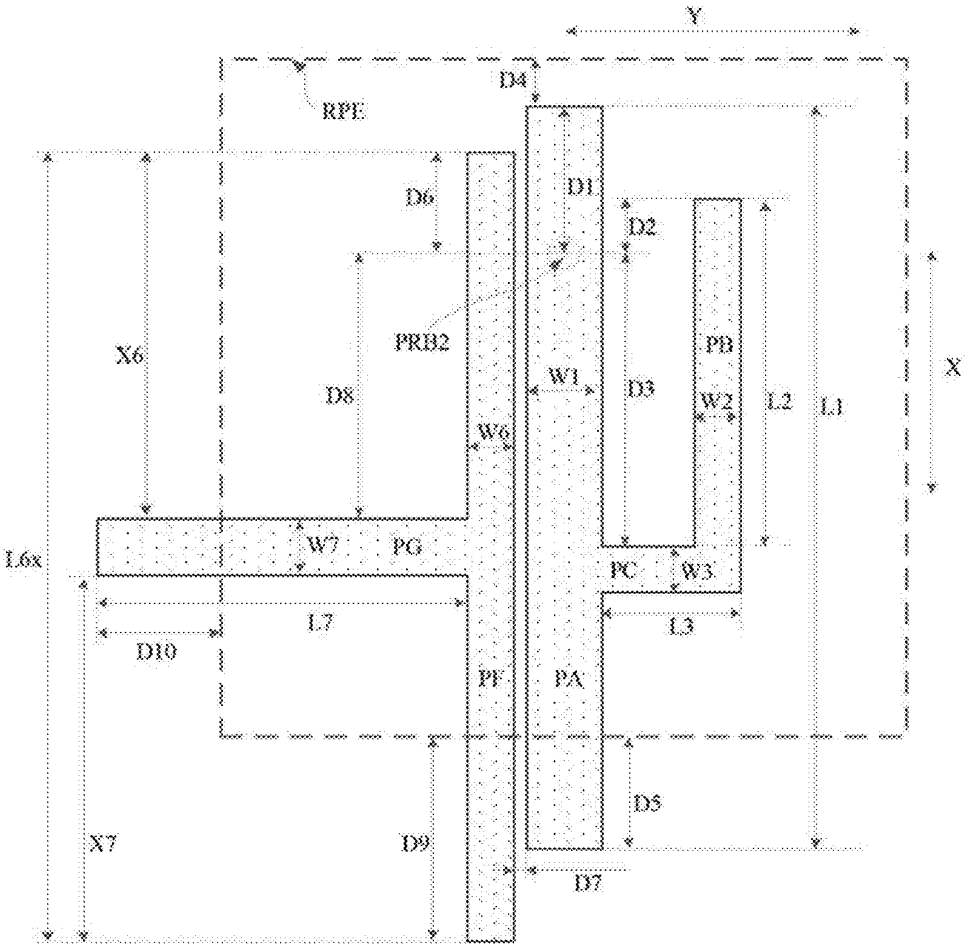
H01Q 9/04	(2006.01)
H01Q 1/22	(2006.01)
H01Q 13/08	(2006.01)

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

CPC ***H01Q 9/0414*** (2013.01); ***H01Q 1/2283*** (2013.01); ***H01Q 13/08*** (2013.01)

(57) **ABSTRACT**

The present disclosure provides a filtering antenna. The filtering antenna includes: a ground layer, a first dielectric layer, a second dielectric layer and a radiating patch and a coupling probe. The coupling probe includes a microstrip line sandwiched between the first and second dielectric layers, and includes a feeder that penetrates the first dielectric layer. The microstrip line includes a trunk line and an open-circuit branch line connected to the trunk line. A distance between a feed center of the microstrip line and a first end of the trunk line is D1, and a distance between an orthographic projection of the first end of the trunk line on the second dielectric layer and an orthographic projection of an edge of the radiating patch on the second dielectric layer is D4, where $2.5 \leq D1/D4 \leq 3.0$.



US 20240347920A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2024/0347920 A1**

(43) **Pub. Date: Oct. 17, 2024**

Kim, JR. et al.

(54) **NESTED WIRE MONOPOLE HF ANTENNA**

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(72) Inventors: **Wayne Kim, JR.**, Virginia Beach, VA (US); **Yueh-Chi Chang**, Salem, NH (US); **Shane D. Blair**, Salem, NH (US); **Henry J. Nizko**, Melbourne, FL (US)

(73) Assignee: **Raytheon Company**, Waltham, MA (US)

(21) Appl. No.: **18/299,179**

(22) Filed: **Apr. 12, 2023**

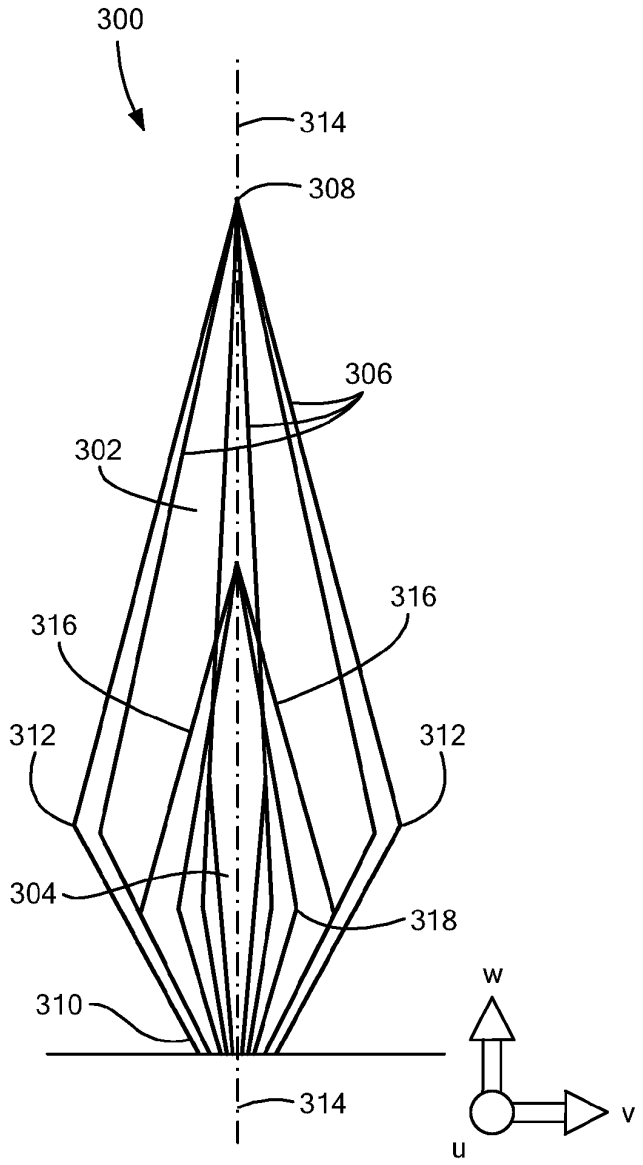
Publication Classification

(51) **Int. Cl.**
H01Q 9/30 (2006.01)
H01Q 21/06 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 9/30*** (2013.01); ***H01Q 21/061*** (2013.01)

(57) **ABSTRACT**

Methods and apparatus for an antenna having first and second nested monopoles each having arms with bends. In some embodiments, the monopoles are offset in clocking angle. In some embodiments, the monopoles are aligned in clocking angle. In embodiments, the bends in the arms may be located at half a total height of the antenna.



US 20240347921A1

(19) **United States**

(12) **Patent Application Publication**

HSU et al.

(10) **Pub. No.: US 2024/0347921 A1**

(43) **Pub. Date: Oct. 17, 2024**

(54) **ANTENNA PACKAGE STRUCTURE**

(71) Applicant: **Advanced Semiconductor Engineering, Inc.**, Kaohsiung (TW)

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(73) Assignee: **Advanced Semiconductor Engineering, Inc.**, Kaohsiung (TW)

(21) Appl. No.: **18/134,511**

(22) Filed: **Apr. 13, 2023**

Publication Classification

(51) **Int. Cl.**

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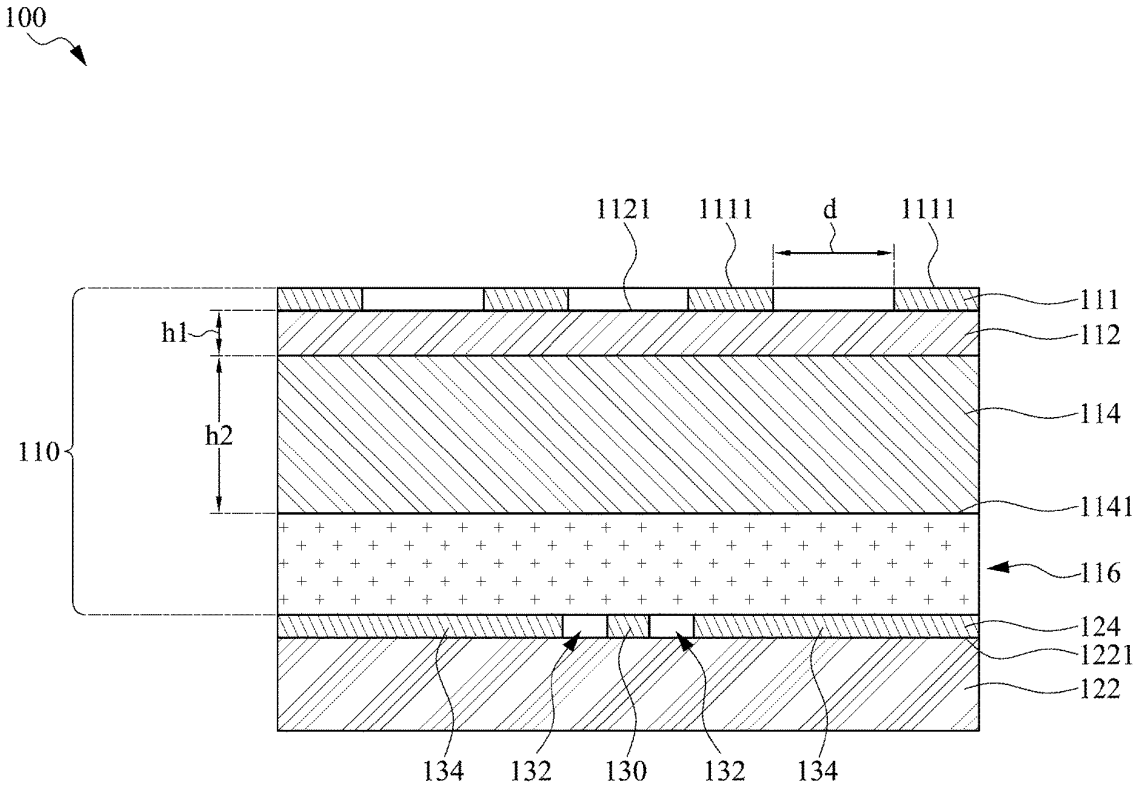
H01Q 1/22 (2006.01)
H01Q 1/38 (2006.01)

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

CPC ***H01Q 15/0013*** (2013.01); ***H01Q 1/2283*** (2013.01); ***H01Q 1/38*** (2013.01)

(57) **ABSTRACT**

The present disclosure provides an antenna package structure, which includes antenna and a transmitting structure. The transmitting structure includes a first dielectric material and a second dielectric material of different dielectric constants, and a frequency selective surface unit. The first dielectric layer and the second dielectric layer are configured to focus the electromagnetic wave radiated between the antenna and the frequency selective surface unit.



US 20240347924A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0347924 A1**

Ikeda et al. (43) **Pub. Date: Oct. 17, 2024**

(54) **ANTENNA DEVICE**

(71) Applicant: **Mitsubishi Electric Corporation**, Tokyo (JP)

(72) Inventors: **Shunichi Ikeda**, Tokyo (JP); **Narihiro Nakamoto**, Tokyo (JP); **Hiromasa Nakajima**, Tokyo (JP); **Tomohiro Takahashi**, Tokyo (JP); **Toru Fukasawa**, Tokyo (JP); **Naoya Noguchi**, Tokyo (JP)

(73) Assignee: **Mitsubishi Electric Corporation**, Tokyo (JP)

(21) Appl. No.: **18/751,593**

(22) Filed: **Jun. 24, 2024**

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2022/000635, filed on Jan. 12, 2022.

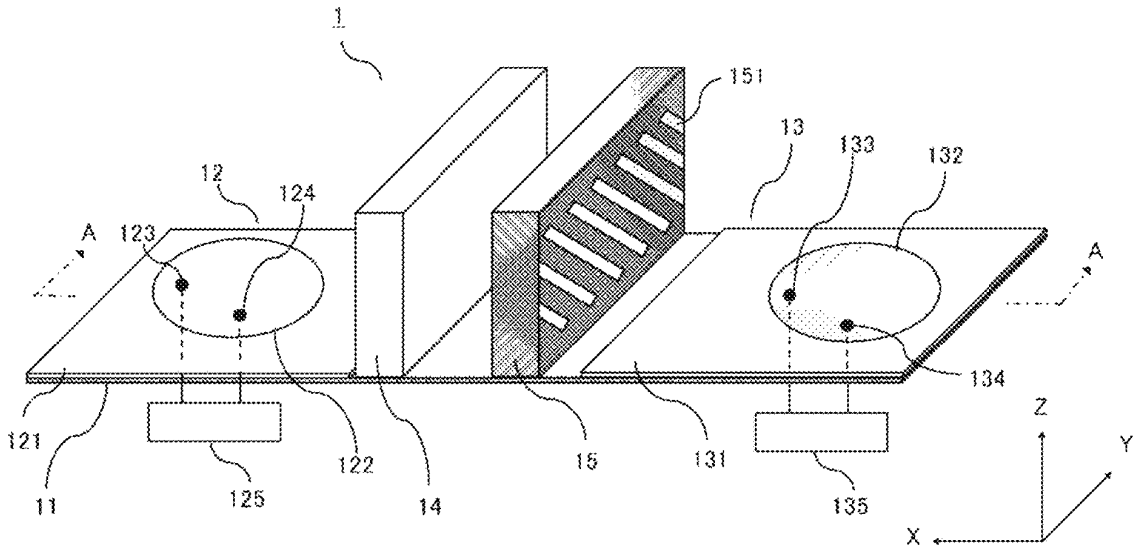
Publication Classification

(51) **Int. Cl.**
H01Q 15/24 (2006.01)
H01Q 1/52 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 15/24*** (2013.01); ***H01Q 1/525*** (2013.01)

(57) **ABSTRACT**

In a conventional antenna device, transmission radio waves transmitted from a transmitting antenna traveling directly to a receiving antenna are blocked by a shield wall disposed between the receiving antenna and the transmitting antenna. However, some of the transmission radio waves are diffracted at the edge of the shield wall and enter the receiving antenna as diffracted waves, affecting the reception of the reception radio waves. In view of this, the shield wall and a polarized wave converter unit are disposed between the transmitting antenna unit and the receiving antenna unit. As a result, vertically polarized wave components of the diffracted waves are converted by the polarized wave converter unit to circularly polarized wave components that are less affecting the reception of the reception radio waves in the receiving antenna, and the diffracted waves are prevented from affecting the receiving operation of the receiving antenna.



US 20240347931A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0347931 A1**

CHOI et al. (43) **Pub. Date: Oct. 17, 2024**

(54) **ELECTRONIC DEVICE INCLUDING ANTENNA ARRAY**

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

(72) Inventors: **Dooseok CHOI**, Suwon-si (KR); **Kyeol KWON**, Suwon-si (KR); **Youngki LEE**, Suwon-si (KR); **Dongkwon CHOI**, Suwon-si (KR)

(73) Assignee: **SAMSUNG ELECTRONICS CO., LTD.**, Suwon-si (KR)

(21) Appl. No.: **18/511,376**

(22) Filed: **Nov. 16, 2023**

(30) **Foreign Application Priority Data**

Apr. 17, 2023 (KR) 10-2023-0050336

Publication Classification

(51) **Int. Cl.**

H01Q 21/29	(2006.01)
H01Q 3/06	(2006.01)
H01Q 21/08	(2006.01)

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

CPC ***H01Q 21/293*** (2013.01); ***H01Q 3/06*** (2013.01); ***H01Q 21/08*** (2013.01)

(57) **ABSTRACT**

An electronic device includes: a first housing including a first surface and a second surface connected to the first surface and having an area that is smaller than an area of the first surface; a second housing including a third surface and a fourth surface connected to the third surface and having an area that is smaller than an area of the third surface; a hinge structure connecting the first housing and the second housing to be foldable relative to each other at a folding axis between a folded state of the electronic device and an unfolded state of the electronic device; a first antenna array provided at the first surface; and a second antenna array provided at the fourth surface; and a flexible board connecting the first antenna array and the second antenna array, wherein the first antenna array and the second antenna array are configured to form a third antenna array and to form a fourth antenna array, according to whether the electronic device is in the unfolded state or in the folded state.