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(19) **United States**
 (12) **Patent Application Publication** (10) **Pub. No.: US 2018/0175483 A1**
 BAO et al. (43) **Pub. Date: Jun. 21, 2018**

(54) **ANTENNA COMPONENT AND MOBILE TERMINAL HAVING THE SAME**

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

(72) Inventors: **Xiaoming BAO**, Dongguan (CN); **Maozhao HUANG**, Dongguan (CN)

(73) Assignee: **GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.**, Dongguan (CN)

(21) Appl. No.: **15/681,712**

(22) Filed: **Aug. 21, 2017**

(30) **Foreign Application Priority Data**

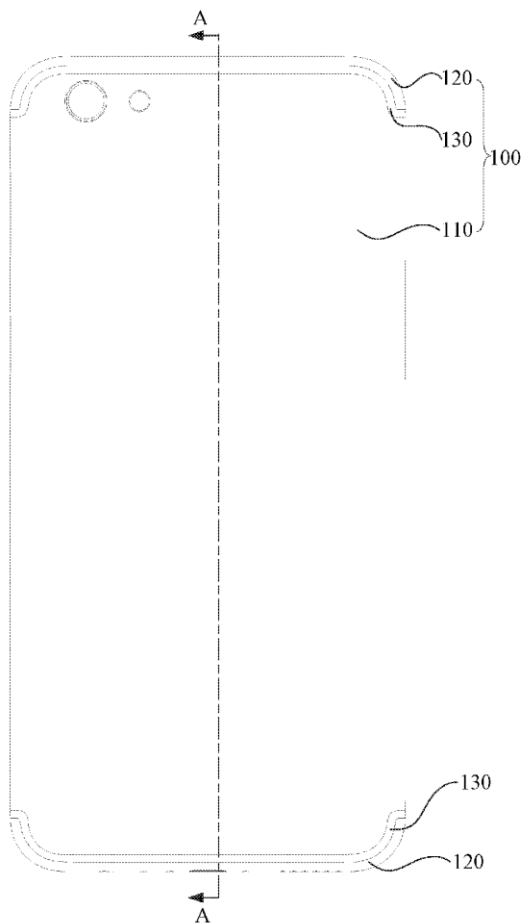
Dec. 15, 2016 (CN) 201621376937.X

Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 9/06 (2006.01)
 (52) **U.S. Cl.**
 CPC *H01Q 1/243* (2013.01); *H01Q 9/065* (2013.01)

(57) **ABSTRACT**

An antenna component includes an antenna body and a conductor. The antenna body includes a PCB board and a spring piece, and a first end of the spring piece is connected to the PCB board. The conductor is configured to be connected to an insulator and an end metal piece, and includes a first conductive portion opposite to the insulator, and a second conductive portion connected to the first conductive portion and opposite to the end metal piece, and the first conductive portion abuts against a second end of the spring piece. A mobile terminal including an antenna component is further provided.





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(19) **United States**
(12) **Patent Application Publication**
TSAI et al.

(10) **Pub. No.: US 2018/0175484 A1**
(43) **Pub. Date: Jun. 21, 2018**

- (54) **MOBILE DEVICE AND MANUFACTURING METHOD THEREOF**
- (71) Applicant: **HTC Corporation**, Taoyuan City (TW)
- (72) Inventors: **Tiao-Hsing TSAI**, Taoyuan City (TW);
Chien-Pin CHIU, Taoyuan City (TW);
Hsiao-Wei WU, Taoyuan City (TW);
Shen-Fu TZENG, Taoyuan City (TW);
Yi-Hsiang KUNG, Taoyuan City (TW);
Li-Yuan FANG, Taoyuan City (TW)
- (73) Assignee: **HTC Corporation**, Taoyuan City (TW)
- (21) Appl. No.: **15/723,336**
- (22) Filed: **Oct. 3, 2017**

Related U.S. Application Data

- (60) Provisional application No. 62/437,226, filed on Dec. 21, 2016.

Publication Classification

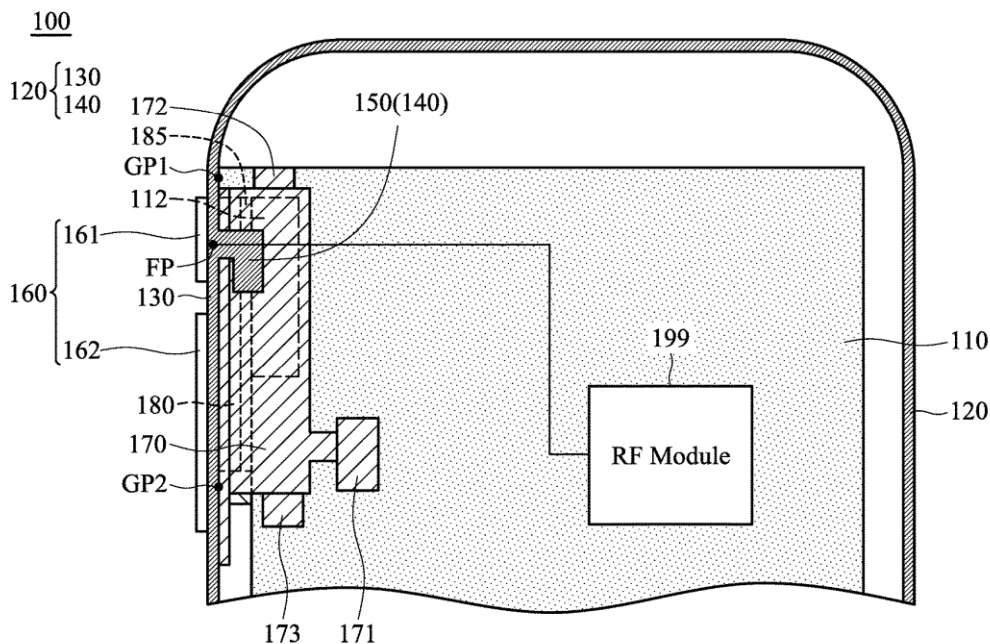
- (51) **Int. Cl.**
H01Q 1/24 (2006.01)
H04B 1/3827 (2006.01)

- H01Q 1/48** (2006.01)
- H01Q 5/35** (2006.01)
- H01Q 9/04** (2006.01)
- H01Q 1/38** (2006.01)

- (52) **U.S. Cl.**
CPC **H01Q 1/243** (2013.01); **H04B 1/3827**
(2013.01); **H01Q 1/48** (2013.01); **H04M**
1/0283 (2013.01); **H01Q 9/0421** (2013.01);
H01Q 1/38 (2013.01); **H01Q 5/35** (2015.01)

(57) **ABSTRACT**

A mobile device includes a first circuit board, a metal frame, an extension radiation element, an electronic component, a second circuit board, and an RF (Radio Frequency) module. The first circuit board includes a system ground plane. The metal frame includes a first portion coupled to the system ground plane. A clearance region is formed between the first portion and the system ground plane. The first portion and the extension radiation element are both coupled to a feeding point. An antenna structure is formed by the first portion and the extension radiation element. The second circuit board is coupled to the electronic component. The electronic component and the second circuit board are both adjacent to the first portion. The RF module is coupled to the feeding point, so as to excite the antenna structure.





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(19) **United States**
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YANG et al. (43) **Pub. Date: Jun. 21, 2018**

(54) **ANTENNA DEVICE AND ELECTRONIC DEVICE USING THE SAME**
 (71) Applicants: **NANNING FUGUI PRECISION INDUSTRIAL CO., LTD.**, Nanning (CN); **HON HAI PRECISION INDUSTRY CO., LTD.**, New Taipei (TW)

H01Q 9/04 (2006.01)
H01Q 1/48 (2006.01)
H01Q 1/24 (2006.01)
 (52) **U.S. Cl.**
 CPC *H01Q 1/38* (2013.01); *H01Q 5/314* (2015.01); *H01Q 1/243* (2013.01); *H01Q 1/48* (2013.01); *H01Q 9/0421* (2013.01)

(72) Inventors: **Chih-Chieh YANG**, New Taipei (TW); **Yi-Hao CHANG**, New Taipei (TW)

(57) **ABSTRACT**

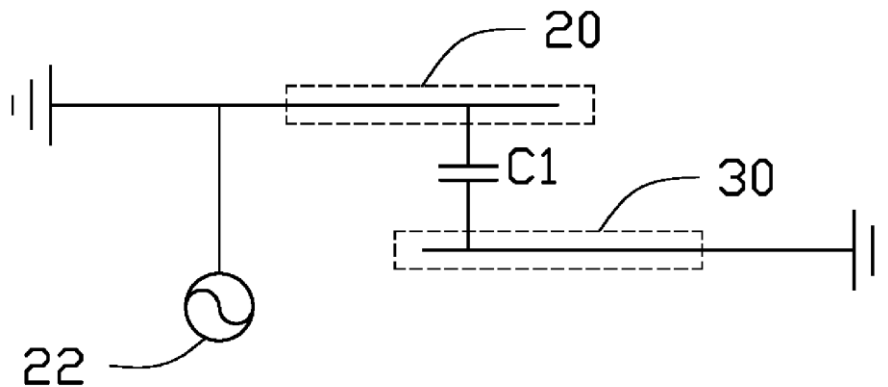
(21) Appl. No.: **15/379,728**

A Planar Inverted-F antenna (PIFA) device includes a circuit board having a first surface, a second surface, and a through hole, an antenna being disposed in the first surface, and a metal member being disposed in the second surface. The through hole is connected between the first surface and the second surface. The antenna couples with the metal member to have a specific capacitive coupling effect through the through hole to enable transmission and reception of specific wireless frequencies by an electronic device having the PIFA.

(22) Filed: **Dec. 15, 2016**

Publication Classification

(51) **Int. Cl.**
H01Q 1/38 (2006.01)
H01Q 5/314 (2006.01)





US 20180183132A1

(19) **United States**

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

(10) **Pub. No.: US 2018/0183132 A1**

(43) **Pub. Date: Jun. 28, 2018**

(54) **MULTI-ANTENNA COMMUNICATION DEVICE**

H01Q 21/00 (2006.01)
H01Q 7/00 (2006.01)

(71) Applicant: **Industrial Technology Research Institute, Hsinchu (TW)**

(52) **U.S. Cl.**
CPC *H01Q 1/24* (2013.01); *H01Q 7/00* (2013.01); *H01Q 21/00* (2013.01); *H01Q 1/48* (2013.01)

(72) Inventors: **Kin-Lu Wong, Hsinchu (TW); Jun-Yu Lu, Hsinchu (TW); De-Ming Chian, Hsinchu (TW); Wei-Yu Li, Hsinchu (TW); Chih-Yu Tsai, Hsinchu (TW)**

(57) **ABSTRACT**

A multi-antenna communication device is provided, including a grounding conductor plane separating a first side space and a second side space and having a first edge. A four-antenna array including first, second, third and fourth antennas is located at the first edge, and has an overall maximum array length extending along the first edge. The first and second antennas are located in the first side space, and the third and fourth antennas are located in the second side space. Each of the first to fourth antennas includes a feeding conductor line, a grounding conductor line, and a radiating conductor portion electrically connected to a signal source through the feeding conductor line and electrically connected to the first edge through the grounding conductor line, thereby forming a loop path and generating at least one resonant mode. The radiating conductor portion has a corresponding projection line segment at the first edge.

(21) Appl. No.: **15/392,255**

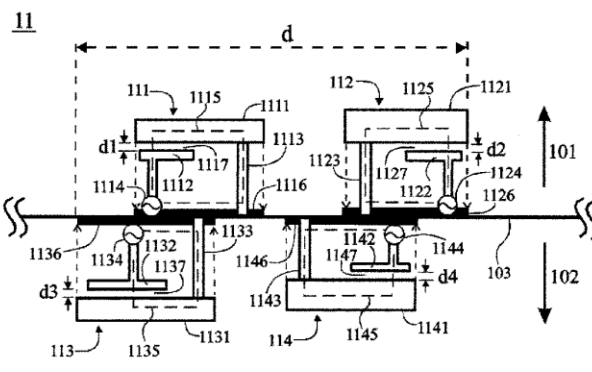
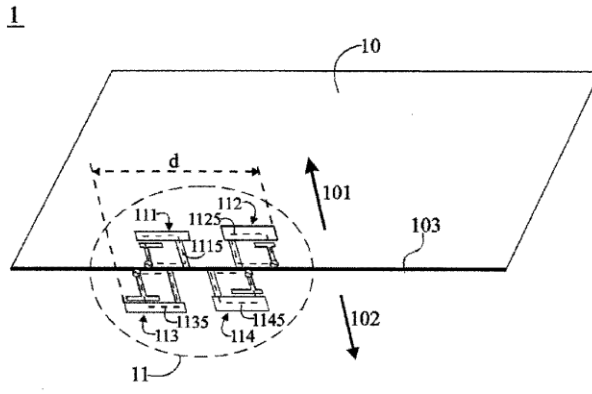
(22) Filed: **Dec. 28, 2016**

(30) **Foreign Application Priority Data**

Dec. 27, 2016 (TW) 105143339

Publication Classification

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





US 20180183135A1

(19) **United States**

(12) **Patent Application Publication**
SUZUKI

(10) **Pub. No.: US 2018/0183135 A1**

(43) **Pub. Date: Jun. 28, 2018**

(54) **ANTENNA, RADIO DEVICE, MOUNTING DEVICE, AND CHARGING DEVICE**

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

CPC *H01Q 1/242* (2013.01); *H02J 7/0042* (2013.01); *H01Q 9/42* (2013.01)

(71) Applicant: **NEC Platforms, Ltd.**, Kawasaki-shi, Kanagawa (JP)

(72) Inventor: **Masaki SUZUKI**, Kanagawa (JP)

(57)

ABSTRACT

(73) Assignee: **NEC Platforms, Ltd.**, Kawasaki-shi, Kanagawa (JP)

(21) Appl. No.: **15/738,709**

In order to implement an external antenna of a radio device with a simple configuration, an antenna according to the present invention includes: a conductor plate; a first linear conductor including a portion disposed substantially in parallel to an edge of the conductor plate, and being curved halfway and connected to the conductor plate with a gap being interposed; a second linear conductor intersecting with a line extending from an end of the first linear conductor opposite to a connection end thereof connected to the conductor plate, and being connected to the conductor plate; a third linear conductor being connected to an end of the second linear conductor opposite to an end thereof connected to the conductor plate, and being disposed substantially in parallel to the first linear conductor; and a fourth linear conductor being disposed in a direction apart from the conductor plate at an end of the third linear conductor opposite to an end thereof connected to the second linear conductor.

(22) PCT Filed: **Mar. 23, 2016**

(86) PCT No.: **PCT/JP2016/001659**

§ 371 (c)(1),

(2) Date: **Dec. 21, 2017**

(30) **Foreign Application Priority Data**

Jul. 17, 2015 (JP) 2015-142796

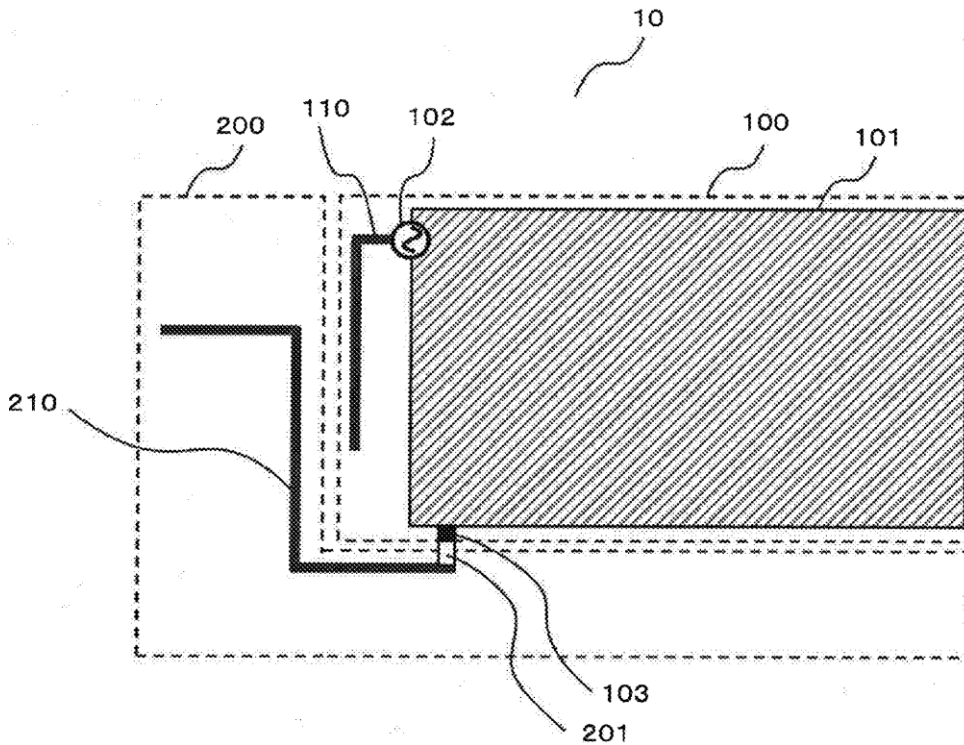
Publication Classification

(51) **Int. Cl.**

H01Q 1/24 (2006.01)

H01Q 9/42 (2006.01)

H02J 7/00 (2006.01)





US 20180183139A1

(19) **United States**

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

(10) **Pub. No.: US 2018/0183139 A1**

(43) **Pub. Date: Jun. 28, 2018**

(54) **ANTENNA STRUCTURE AND WIRELESS COMMUNICATION DEVICE USING SAME**

(71) Applicant: **Chiun Mai Communication Systems, Inc.**, New Taipei (TW)

(72) Inventors: **CHIEN-CHANG LIU**, New Taipei (TW); **TING-CHIH TSENG**, New Taipei (TW); **KUN-LIN SUNG**, New Taipei (TW); **HSI-CHIEH CHEN**, New Taipei (TW); **PENG-YU LAI**, New Taipei (TW)

(21) Appl. No.: **15/835,401**

(22) Filed: **Dec. 7, 2017**

(30) **Foreign Application Priority Data**

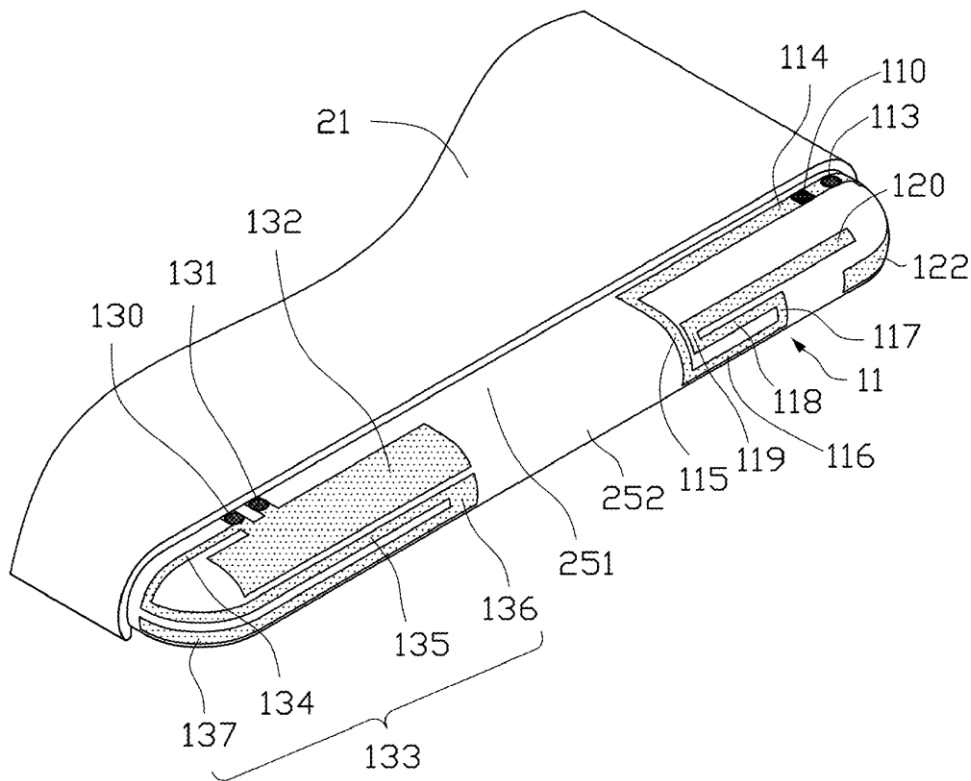
Dec. 23, 2016 (CN) 201611206378.2

Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 5/35 (2006.01)
H01Q 1/48 (2006.01)
(52) **U.S. Cl.**
CPC *H01Q 1/243* (2013.01); *H01Q 1/48* (2013.01); *H01Q 5/35* (2015.01)

(57) **ABSTRACT**

An antenna structure includes a first antenna with a first feed point feeding current, a first radiating portion, a second radiating portion, and a first ground point. The first radiating portion is electrically connected to the first feed point and receives radiation signals in a first frequency band. The second radiating portion is electrically connected to the first feed point and receives and sends radiation signals in a second frequency band. The first ground point is spaced apart from the first feed point and is electrically connected to the second radiating portion.





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(19) **United States**

(12) **Patent Application Publication**
Izawa

(10) **Pub. No.: US 2018/0183145 A1**

(43) **Pub. Date: Jun. 28, 2018**

(54) **ANTENNA DEVICE**

(71) Applicant: **Murata Manufacturing Co., Ltd.**,
Nagaokakyo-shi (JP)

(72) Inventor: **Masahiro Izawa**, Nagaokakyo-shi (JP)

(21) Appl. No.: **15/902,073**

(22) Filed: **Feb. 22, 2018**

H01Q 7/00 (2006.01)

H01Q 21/00 (2006.01)

H01Q 9/30 (2006.01)

H01Q 5/371 (2006.01)

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

CPC **H01Q 1/521** (2013.01); **H01Q 1/48**

(2013.01); **H01Q 5/371** (2015.01); **H01Q**

21/0006 (2013.01); **H01Q 9/30** (2013.01);

H01Q 7/00 (2013.01)

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2016/
081034, filed on Oct. 20, 2016.

(30) **Foreign Application Priority Data**

Oct. 22, 2015 (JP) 2015-207679

Publication Classification

(51) **Int. Cl.**

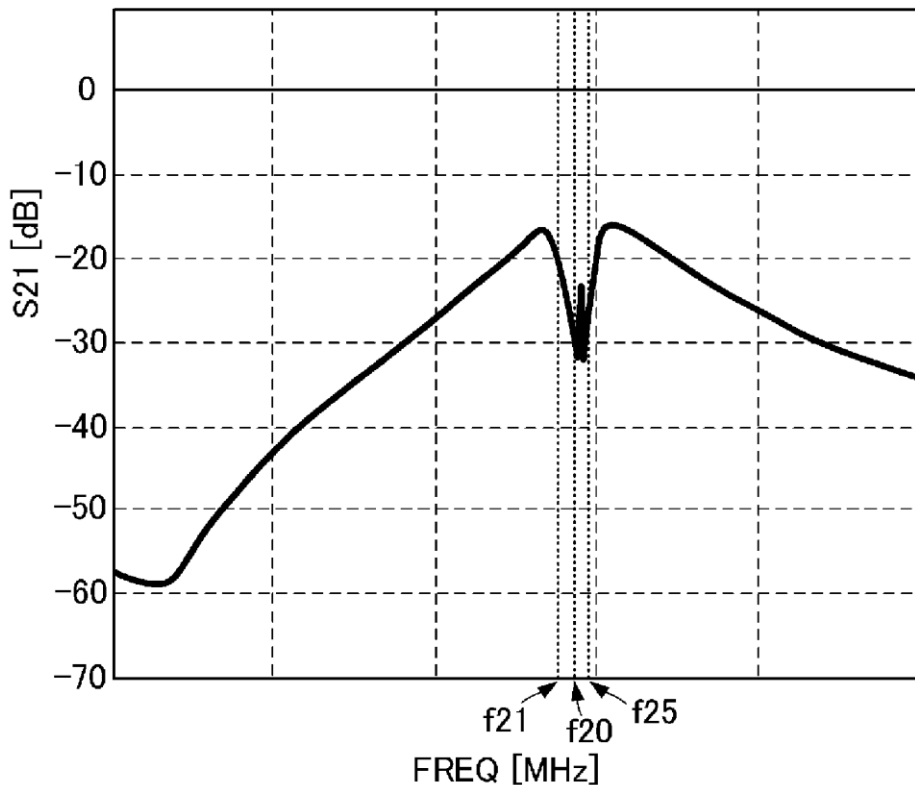
H01Q 1/52 (2006.01)

H01Q 1/48 (2006.01)

(57)

ABSTRACT

An antenna device including a ground conductor and first and second antennas. The first and second antennas are linear antennas and have respective feeding points at ends on a side of the ground conductor. The first and second antennas perform transmission/reception at first and second frequencies that are adjacent to each other, respectively. Moreover, the first antenna includes a first monopole antenna and a loop antenna branched off from the first monopole antenna. An end of the loop antenna opposing a branching point at which the loop antenna is branched off from the first monopole antenna is short-circuited between the feeding points of the first and second antennas on the ground conductor.





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(19) **United States**

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

(10) **Pub. No.: US 2018/0183149 A1**

(43) **Pub. Date: Jun. 28, 2018**

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

(71) Applicant: **FUJITSU LIMITED**, Kawasaki-shi (JP)

(72) Inventors: **Yohei KOGA**, Kawasaki (JP); **Takashi YAMAGAJI**, Yokosuka (JP); **Manabu KAI**, Yokohama (JP); **Mitsuharu HOSHINO**, Kawasaki (JP); **Masatomo MORI**, Kawasaki (JP)

(73) Assignee: **FUJITSU LIMITED**, Kawasaki-shi (JP)

(21) Appl. No.: **15/832,096**

(22) Filed: **Dec. 5, 2017**

(30) **Foreign Application Priority Data**

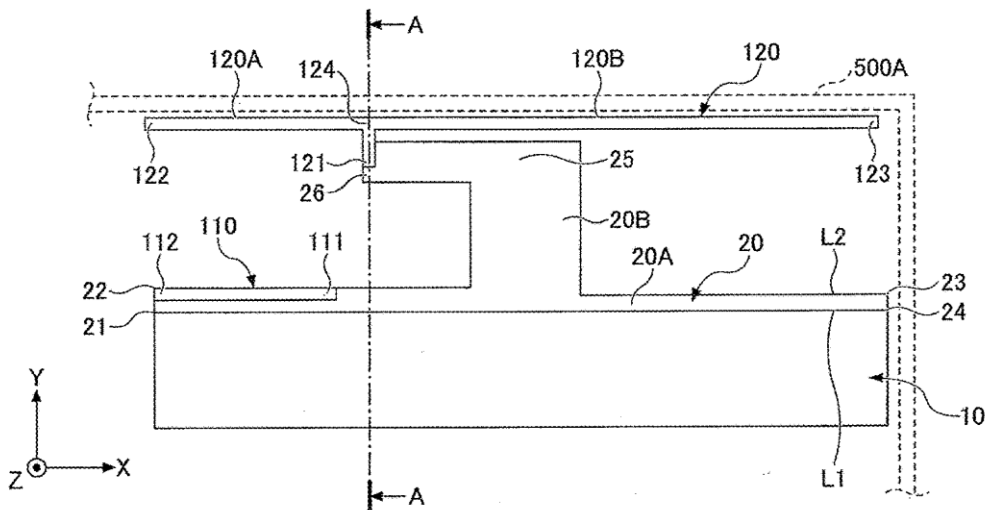
Dec. 28, 2016 (JP) 2016-256728

Publication Classification

(51) **Int. Cl.**
H01Q 9/38 (2006.01)
H01Q 1/48 (2006.01)
H01Q 21/00 (2006.01)
(52) **U.S. Cl.**
CPC **H01Q 9/38** (2013.01); **H01Q 21/0006** (2013.01); **H01Q 1/48** (2013.01)

(57) **ABSTRACT**

An antenna apparatus includes a ground plane having an edge; a monopole type first antenna element having a first feed point and configured to communicate at a first frequency; and a monopole type second antenna element having a second feed point and configured to communicate at a second frequency, the second antenna element extending from the second feed point in a direction away from the edge. An end portion of the first antenna element is arranged closer to the ground plane than an end portion of the second antenna element is. A length of an interval between the first feed point and the second feed point is in a range of from 0.25-fold to 0.7-fold of an electrical length of a first wavelength at the first frequency. A length of the second antenna element is a length in a range of from 0.15-fold to 0.55-fold of the electrical length.





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(19) **United States**

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ZHAO et al.

(10) **Pub. No.: US 2018/0183151 A1**

(43) **Pub. Date: Jun. 28, 2018**

(54) **ANTENNA DEVICE FOR MOBILE
TERMINAL AND MOBILE TERMINAL**

H01Q 1/24 (2006.01)

H04M 1/02 (2006.01)

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

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

CPC *H01Q 13/18* (2013.01); *H04M 1/0283*
(2013.01); *H01Q 1/243* (2013.01); *H01Q 5/35*
(2015.01)

(72) Inventors: **Ning ZHAO**, Dongguan (CN); **Haijun
TANG**, Dongguan (CN); **Guolin LIU**,
Dongguan (CN); **Shasha HU**,
Dongguan (CN)

(57)

ABSTRACT

An antenna device includes a slot, a connecting assembly, a first capacitor, a first match circuit, an antenna and a second match circuit. The slot is defined in a shell of the mobile terminal. The slot separates the shell into a first part and a second part. The first part is configured to couple with a mainboard via a first feeding point to form a slot antenna. The connecting assembly connects the first part with the second part. The first capacitor couples the first part and the first feeding point. The first match circuit couples the first capacitor and the first feeding point. The antenna is configured to send a signal through the slot. The antenna is disposed above the mainboard and below the slot and the antenna couples with the mainboard via a second feeding point.

(21) Appl. No.: **15/668,798**

(22) Filed: **Aug. 4, 2017**

(30) **Foreign Application Priority Data**

Dec. 28, 2016 (CN) 201611235437.9

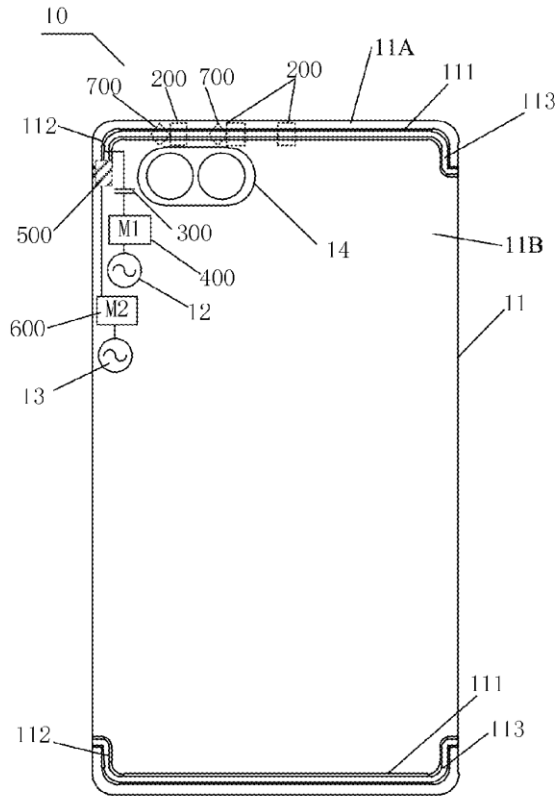
Dec. 28, 2016 (CN) 201621462737.6

Publication Classification

(51) **Int. Cl.**

H01Q 13/18 (2006.01)

H01Q 5/35 (2006.01)





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(19) **United States**

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

(10) **Pub. No.: US 2018/0183910 A1**

(43) **Pub. Date: Jun. 28, 2018**

- (54) **HOUSING ASSEMBLY FOR TERMINAL, TERMINAL AND MOBILE PHONE**
- (71) Applicant: **GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.**, Dongguan (CN)
- (72) Inventors: **Qing WU**, Dongguan (CN); **Yizhou LUO**, Dongguan (CN); **Liang GU**, Dongguan (CN)
- (73) Assignee: **GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.**, Dongguan (CN)

Publication Classification

- (51) **Int. Cl.**
H04M 1/02 (2006.01)
H01Q 13/10 (2006.01)
H01Q 1/24 (2006.01)
H01Q 7/08 (2006.01)
H01Q 5/50 (2006.01)
- (52) **U.S. Cl.**
 CPC *H04M 1/026* (2013.01); *H01Q 13/10* (2013.01); *H01Q 5/50* (2015.01); *H01Q 1/243* (2013.01); *H01Q 7/08* (2013.01); *H04M 1/0266* (2013.01)

(21) Appl. No.: **15/698,123**

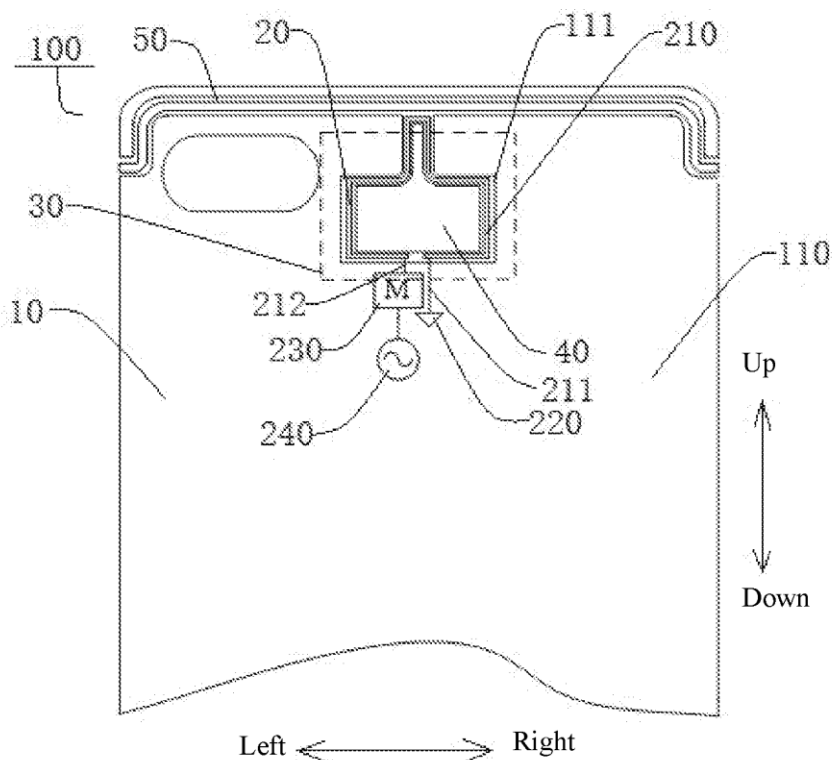
(22) Filed: **Sep. 7, 2017**

(30) **Foreign Application Priority Data**

Dec. 23, 2016 (CN) 201611206794.2
 Dec. 23, 2016 (CN) 201621434716.3

(57) **ABSTRACT**

A housing assembly for a terminal and a terminal are provided. The housing assembly includes a housing, an antenna radiator and a ferrite. The antenna radiator is positioned at an outer face of the housing, and has a first orthographic projection region on the outer face. The ferrite is arranged on an inner face of the housing, and has a second orthographic projection region on the outer face. The first orthographic projection region is located in the second orthographic projection region.





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(19) **United States**

(12) **Patent Application Publication**
CHEN

(10) **Pub. No.: US 2018/0191057 A1**

(43) **Pub. Date: Jul. 5, 2018**

(54) **MINIATURIZED MULTI-BAND ANTENNA**

H01Q 21/30 (2006.01)

H01Q 5/371 (2006.01)

(71) Applicant: **HON HAI PRECISION INDUSTRY CO., LTD.**, New Taipei (TW)

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

CPC *H01Q 1/243* (2013.01); *H01Q 1/38* (2013.01); *H01Q 5/371* (2015.01); *H01Q 21/30* (2013.01); *H01Q 5/378* (2015.01)

(72) Inventor: **WEI-YU CHEN**, New Taipei (TW)

(21) Appl. No.: **15/713,808**

(57)

ABSTRACT

(22) Filed: **Sep. 25, 2017**

A miniaturized antenna providing multiband functionality includes a ground portion, a feeder, a first radiator, and a second radiator. The ground portion is grounded. The feeder has a feed end. The feed end can transmit and receive radio frequency (RF) signals. The first radiator is connected to the ground portion. The first radiator and the feeder are spaced apart from each other by a gap. The gap can cause a coupling between the first radiator and the feeder to transmit the RF signal. The second radiator is connected to the first radiator. The second radiator can transmit the RF signal from the first radiator. Multi-band operation is obtained and size of antenna is reduced.

(30) **Foreign Application Priority Data**

Dec. 30, 2016 (CN) 201611262376.5

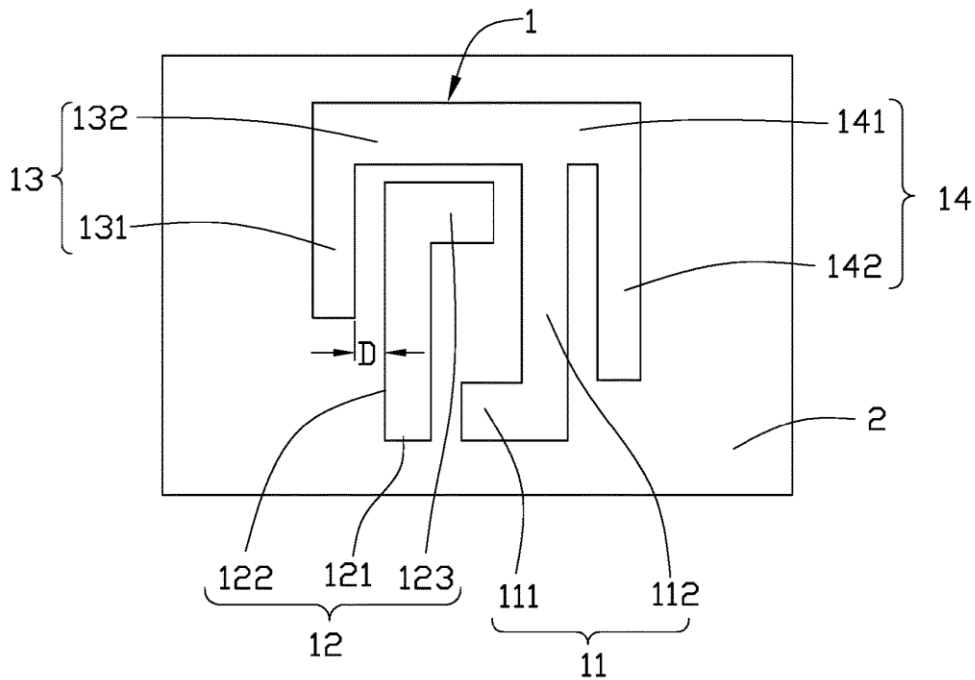
Publication Classification

(51) **Int. Cl.**

H01Q 1/24 (2006.01)

H01Q 1/38 (2006.01)

H01Q 5/378 (2006.01)





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(19) **United States**

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

(10) **Pub. No.: US 2018/0191059 A1**

(43) **Pub. Date: Jul. 5, 2018**

(54) **BEAM FORMING AUXILIARY UNIT FOR ANTENNA AND TERMINAL INCLUDING THE SAME**

H01Q 3/40 (2006.01)
H01Q 21/22 (2006.01)

(52) **U.S. Cl.**
CPC *H01Q 1/243* (2013.01); *H01Q 21/22* (2013.01); *H01Q 3/40* (2013.01); *H04B 7/0617* (2013.01)

(71) Applicants: **Samsung Electronics Co., Ltd.**,
Suwon-si (KR); **Inha University Research and Business Foundation**,
Incheon (KR)

(72) Inventors: **Seungtae KO**, Suwon-si (KR);
Jungsuek OH, Incheon (KR); **Youngju LEE**, Seoul (KR)

(21) Appl. No.: **15/822,781**

(22) Filed: **Nov. 27, 2017**

(30) **Foreign Application Priority Data**

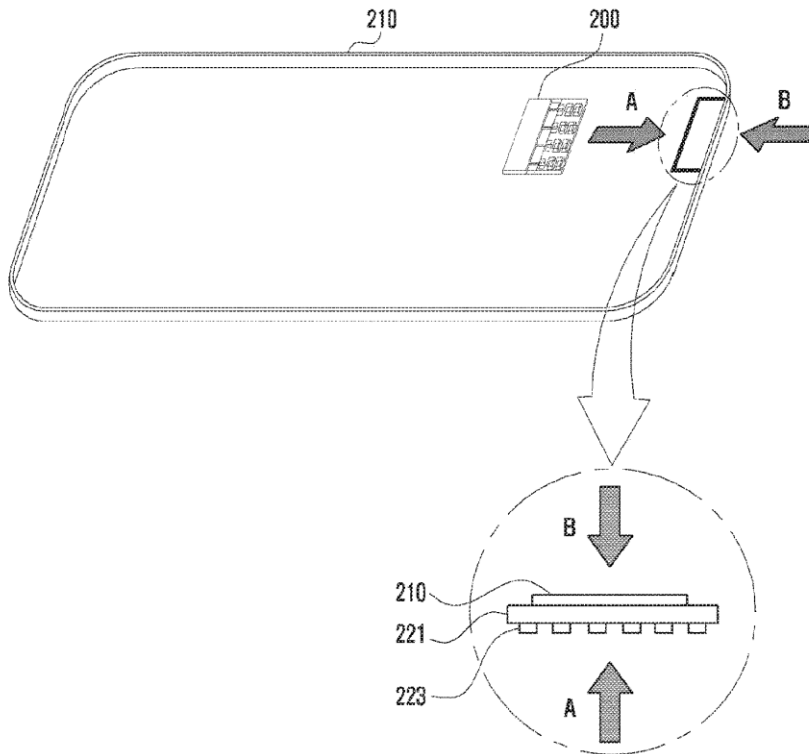
Dec. 30, 2016 (KR) 10-2016-0184363

Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H04B 7/06 (2006.01)

(57) **ABSTRACT**

The present disclosure relates to a communication method and system for converging a 5th-Generation (5G) communication system for supporting higher data rates beyond a 4th-Generation (4G) system with a technology for Internet of Things (IoT). The present disclosure may be applied to intelligent services based on the 5G communication technology and the IoT-related technology, such as smart home, smart building, smart city, smart car, connected car, health care, digital education, smart retail, security and safety services. A terminal is provided. The terminal includes a metal bezel disposed along an edge of the terminal, an antenna incorporated into the terminal and configured to emit electronic waves, and a beam forming auxiliary unit incorporated into the terminal, separately disposed by a predetermined distance from the antenna, and configured such that the electronic waves emitted from the antenna pass through the metal bezel.





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(19) **United States**

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

(10) **Pub. No.: US 2018/0191060 A1**

(43) **Pub. Date: Jul. 5, 2018**

(54) **MULTIPLE ANTENNA APPARATUS**

Publication Classification

(71) Applicant: **PEGATRON CORPORATION,**
TAIPEI CITY (TW)

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 13/10 (2006.01)
H01Q 5/35 (2006.01)
H04M 1/02 (2006.01)
H01Q 1/48 (2006.01)

(72) Inventors: **Chien-Yi Wu,** Taipei City (TW);
Chao-Hsu Wu, TAIPEI CITY (TW);
Yu-Yi Chu, TAIPEI CITY (TW);
Tse-Hsuan Wang, TAIPEI CITY (TW);
Shih-Keng Huang, TAIPEI CITY
(TW); **Chia-Chi Chang,** TAIPEI CITY
(TW)

(52) **U.S. Cl.**
CPC *H01Q 1/243* (2013.01); *H01Q 13/10*
(2013.01); *H04B 1/0064* (2013.01); *H04M*
1/0283 (2013.01); *H01Q 1/48* (2013.01);
H01Q 5/35 (2015.01)

(73) Assignee: **PEGATRON CORPORATION,**
TAIPEI CITY (TW)

(57) **ABSTRACT**

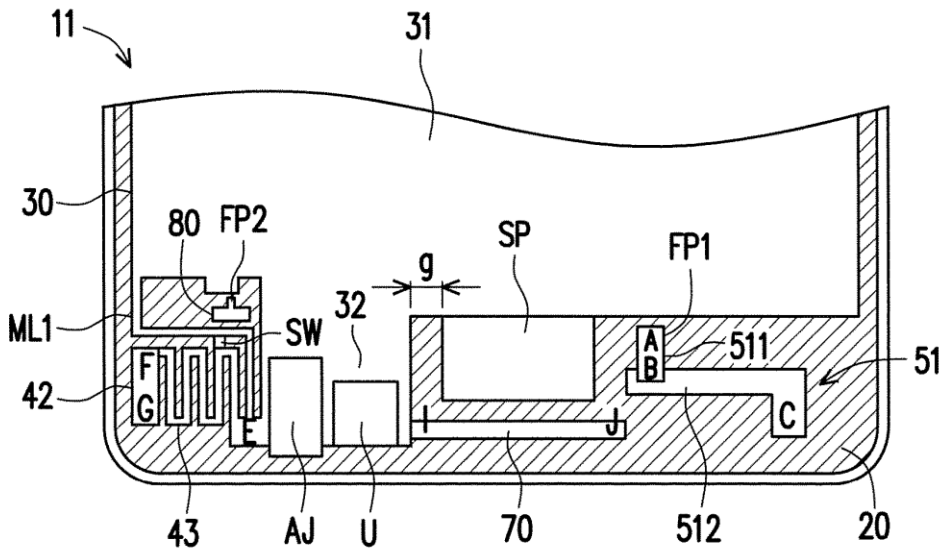
(21) Appl. No.: **15/847,519**

A multiple antenna apparatus is provided. A first feed antenna unit is shared for receiving and transmitting radio frequency (RF) signals corresponding to a bandwidth of a first resonance mode, so as to increase antenna configurable space of the multiple antenna apparatus, and thus a closed slot antenna formed by a wire, a ground plane and a radiation element is able to be configured in the multiple antenna apparatus to receive and transmit the RF signals corresponding to a second resonance mode.

(22) Filed: **Dec. 19, 2017**

(30) **Foreign Application Priority Data**

Jan. 5, 2017 (TW) 106100275





US 20180191063A1

(19) **United States**

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

(10) **Pub. No.: US 2018/0191063 A1**

(43) **Pub. Date: Jul. 5, 2018**

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

Publication Classification

(71) Applicant: **Asahi Glass Company, Limited,**
Chiyoda-ku (JP)

(51) **Int. Cl.**
H01Q 1/48 (2006.01)
H01Q 9/04 (2006.01)
H01Q 1/24 (2006.01)

(72) Inventors: **Ryuta SONODA,** Chiyoda-ku (JP);
Koji Ikawa, Chiyoda-ku (JP); **Toshiki Sayama,** Chiyoda-ku (JP)

(52) **U.S. Cl.**
CPC **H01Q 1/48** (2013.01); **G02B 6/0088**
(2013.01); **H01Q 1/243** (2013.01); **H01Q 9/0457** (2013.01)

(73) Assignee: **Asahi Glass Company, Limited,**
Chiyoda-ku (JP)

(21) Appl. No.: **15/905,307**

(57) **ABSTRACT**

(22) Filed: **Feb. 26, 2018**

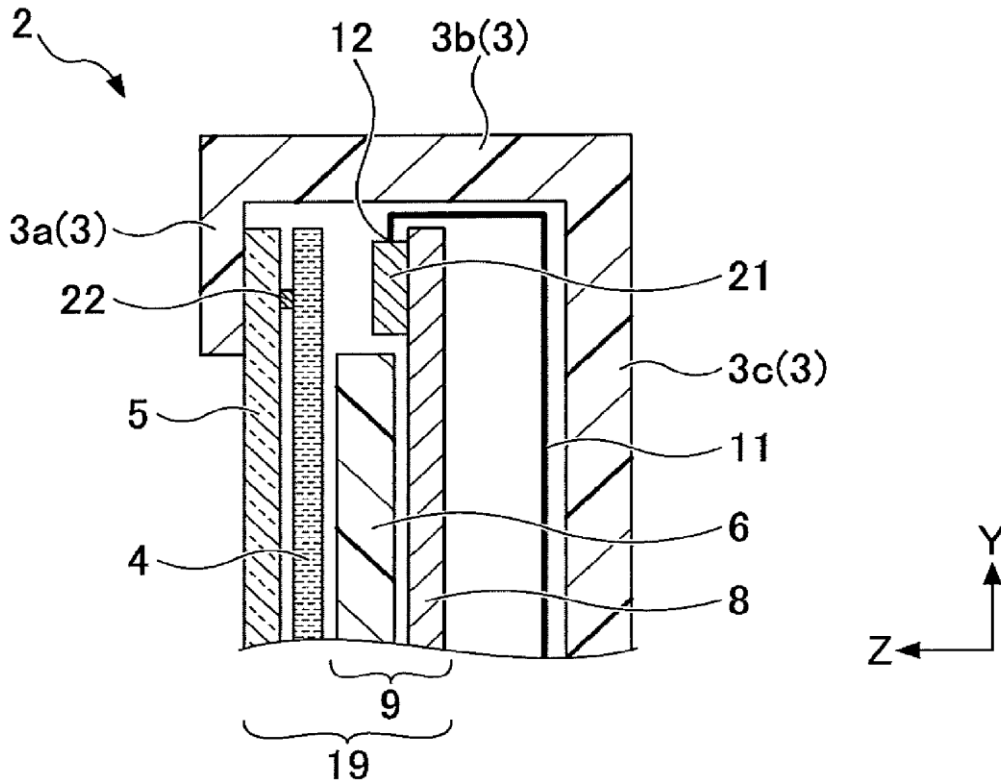
Related U.S. Application Data

(63) Continuation of application No. PCT/JP2016/074470, filed on Aug. 23, 2016.

(30) **Foreign Application Priority Data**

Sep. 1, 2015 (JP) 2015-172383

An antenna structure includes a radiating element; a power feeding element configured to feed power to the radiating element in a noncontact manner; a backlight chassis, on which a light source for generating light is attached, a liquid crystal panel being irradiated with the light; and a transmission line conductably connected to the backlight chassis, the power feeding element being connected to an end of the transmission line.





US 20180191077A1

(19) **United States**

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

(10) **Pub. No.: US 2018/0191077 A1**
(43) **Pub. Date: Jul. 5, 2018**

(54) **ELECTRONIC DEVICE**

Publication Classification

(71) Applicant: **Chiun Mai Communication Systems, Inc.**, New Taipei (TW)
(72) Inventors: **KWANG-PI LEE**, New Taipei (TW); **WEI-TING CHENG**, New Taipei (TW); **YEN-HUI LIN**, New Taipei (TW); **SZU-TSO LIN**, New Taipei (TW)

(51) **Int. Cl.**
H01Q 13/10 (2006.01)
H01Q 1/24 (2006.01)
(52) **U.S. Cl.**
CPC **H01Q 13/10** (2013.01); **H01Q 1/48** (2013.01); **H01Q 1/243** (2013.01)

(57) **ABSTRACT**

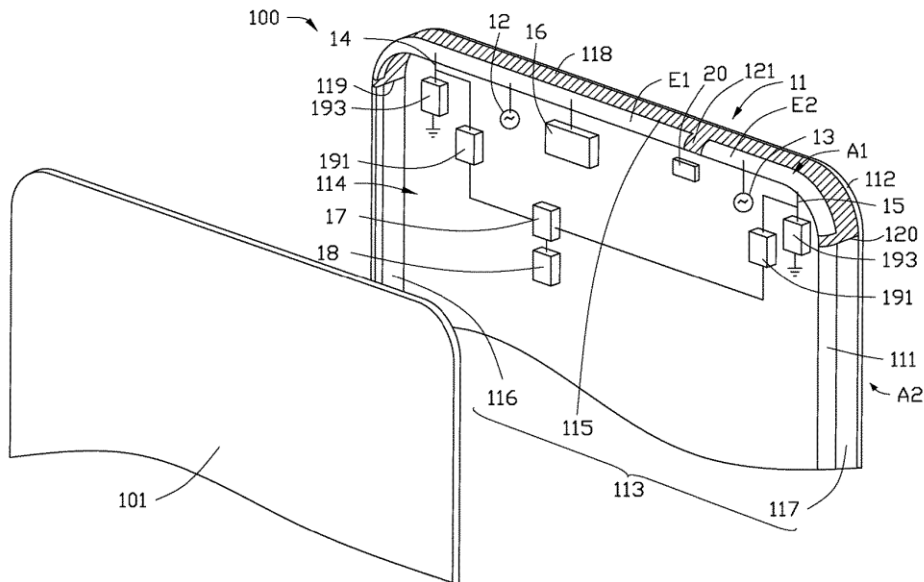
An electronic device includes a housing. The housing defines a slot and a groove communicating with the slot. The housing is divided into at least a first radiating portion and a second radiating portion by the slot and the groove. The first radiating portion is spaced apart from the second radiating portion. The first radiating portion and the second radiating portion cooperatively serve as an antenna structure of the electronic device to receive and/or transmit wireless signals. The electronic device further performs a predetermined function through the groove.

(21) Appl. No.: **15/838,369**

(22) Filed: **Dec. 12, 2017**

(30) **Foreign Application Priority Data**

Jan. 5, 2017 (CN) 201710007308.2





US 20180198492A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2018/0198492 A1**

Zhao et al.

(43) **Pub. Date:**

Jul. 12, 2018

(54) **ANTENNA SYSTEM WITH FEEDLINE CONDUCTORS AT LEAST PARTIALLY TRAVERSING A GAP BETWEEN OPEN ENDS OF ARMS**

(57) **ABSTRACT**

The present application provides an antenna system for use in an electronic device. The antenna system includes a conductive substrate having a width, which corresponds to the distance between two opposite side edges of the conductive substrate proximate one end of the device. The antenna system further includes a pair of conductive arms, where each conductive arm in the pair of conductive arms has a connected end, which couples to the conductive substrate at alternative ones of the opposite side edges of the conductive substrate proximate the one end of the device. Each conductive arm further has an open end which extends away from the respective coupled side edge toward the other one of the opposite side edges in a direction of extension. The open ends of the conductive arms in the pair extend toward one another, stopping short of touching or overlapping the other conductive arm in the pair in the direction of extension away from the respective coupled side edge. Correspondingly, a gap is present between the respective open ends of the pair of conductive arms. A signal source is coupled to each of conductive arms proximate the respective open ends of the pair of conductive arms for supplying a signal. The signal source is coupled to at least one of the conductive arms via a respective feed line conductor, where the feed line conductor, that is coupled to the open end of the at least one of the pair of conductive arms, extends in the direction of extension which traverses at least a portion of the gap between the open ends of the conductive arms.

(71) Applicant: **Motorola Mobility LLC**, Chicago, IL (US)

(72) Inventors: **Junsheng Zhao**, Vernon Hills, IL (US); **Hugh Smith**, Palatine, IL (US); **Haixia Liu**, Xiamen (CN)

(21) Appl. No.: **15/839,775**

(22) Filed: **Dec. 12, 2017**

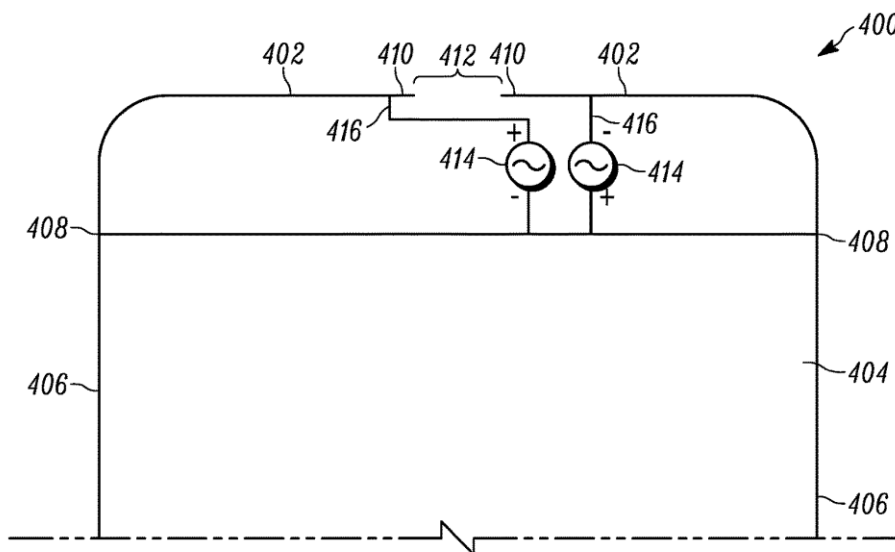
(30) **Foreign Application Priority Data**

Jan. 10, 2017 (CN) 2017-10018219.8

Publication Classification

(51) **Int. Cl.**
H04B 5/00 (2006.01)
H04M 1/737 (2006.01)

(52) **U.S. Cl.**
CPC **H04B 5/0093** (2013.01); **H04B 5/0037** (2013.01); **H04M 1/737** (2013.01); **H04B 5/0031** (2013.01)





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(19) **United States**

(12) **Patent Application Publication**
Bonnet

(10) **Pub. No.: US 2018/0205137 A1**

(43) **Pub. Date: Jul. 19, 2018**

(54) **ANTENNA FOR MOBILE COMMUNICATION DEVICE**

Publication Classification

(71) Applicant: **STMICROELECTRONICS (TOURS) SAS**, Tours (FR)

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 9/04 (2006.01)
H01Q 5/30 (2006.01)

(72) Inventor: **Benoit Bonnet**, Tours (FR)

(52) **U.S. Cl.**
CPC *H01Q 1/242* (2013.01); *H01Q 1/48* (2013.01); *H01Q 5/30* (2015.01); *H01Q 9/0421* (2013.01)

(21) Appl. No.: **15/691,285**

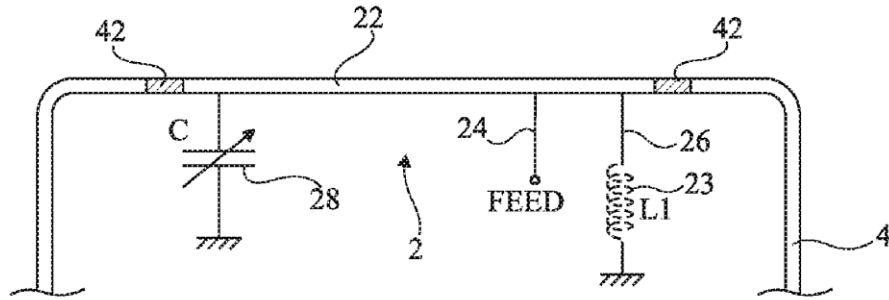
(22) Filed: **Aug. 30, 2017**

(57) **ABSTRACT**

(30) **Foreign Application Priority Data**

Jan. 19, 2017 (FR) 1750418
Jan. 19, 2017 (FR) 1750419

The invention relates to an antenna comprising: an elongate conducting band; an antenna socket; a connection to earth; at least one first capacitive element of adjustable capacitance; and at least one first inductive element in series with the first capacitive element.





US 20180205146A1

(19) **United States**

(12) **Patent Application Publication**
HUANG

(10) **Pub. No.: US 2018/0205146 A1**

(43) **Pub. Date: Jul. 19, 2018**

- (54) **MOBILE DEVICE WITH MULTIPLE-ANTENNA SYSTEM**
- (71) Applicant: **Futurewei Technologies, Inc.**, Plano, TX (US)
- (72) Inventor: **Wei HUANG**, San Diego, CA (US)
- (73) Assignee: **Futurewei Technologies, Inc.**, Plano, TX (US)
- (21) Appl. No.: **15/868,958**
- (22) Filed: **Jan. 11, 2018**

Related U.S. Application Data

- (60) Provisional application No. 62/446,173, filed on Jan. 13, 2017.

Publication Classification

- (51) **Int. Cl.**
H01Q 1/52 (2006.01)
H01Q 1/48 (2006.01)
H01Q 1/24 (2006.01)

- (52) **U.S. Cl.**
CPC *H01Q 1/523* (2013.01); *H01Q 1/48* (2013.01); *H01Q 13/10* (2013.01); *H01Q 1/2258* (2013.01); *H01Q 21/08* (2013.01); *H01Q 1/243* (2013.01)

(57) **ABSTRACT**

Embodiments provide mobile device comprising a body frame; processing circuitry affixed to the body frame; a first antenna and a second antenna arranged adjacent to each other in the body frame, the first antenna and the second antenna electrically coupled to the processing circuitry to provide radiation, wherein the first antenna and the second antenna share a common ground defined by the body frame, wherein the first antenna is configured to provide radiation of a first polarization, and wherein the second antenna is configured to provide radiation of a second polarization substantially orthogonal to the first polarization to provide a signal isolation between the first antenna and the second antenna.

