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(19) **United States**

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KIM et al.

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(43) **Pub. Date: Nov. 21, 2019**

(54) **MOBILE TERMINAL**

Publication Classification

(71) Applicant: **LG ELECTRONICS INC.**, Seoul (KR)

(72) Inventors: **Dongjin KIM**, Seoul (KR); **Yunmo KANG**, Seoul (KR); **Youngbae KWON**, Seoul (KR); **Yeomin YOUN**, Seoul (KR); **Jihun HA**, Seoul (KR)

(73) Assignee: **LG ELECTRONICS INC.**, Seoul (KR)

(21) Appl. No.: **16/530,760**

(22) Filed: **Aug. 2, 2019**

Related U.S. Application Data

(63) Continuation of application No. 16/020,925, filed on Jun. 27, 2018, now Pat. No. 10,431,872.

(60) Provisional application No. 62/653,548, filed on Apr. 5, 2018.

Foreign Application Priority Data

May 3, 2018 (KR) 10-2018-0051313

(51) **Int. Cl.**

H01Q 1/24 (2006.01)

H04B 1/401 (2006.01)

H01Q 21/30 (2006.01)

H01Q 13/10 (2006.01)

H04M 1/02 (2006.01)

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

CPC **H01Q 1/242** (2013.01); **H04B 1/401**

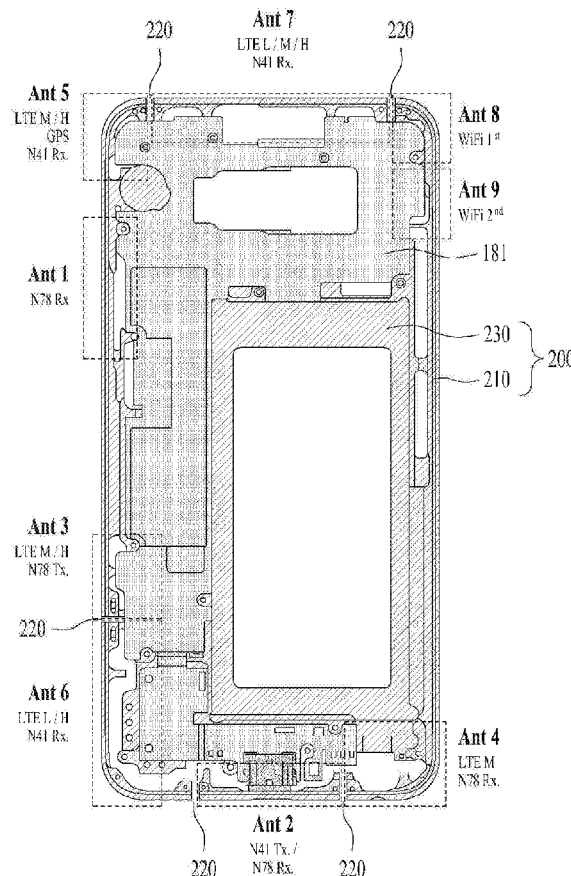
(2013.01); **H04M 1/0266** (2013.01); **H01Q**

13/10 (2013.01); **H01Q 21/30** (2013.01)

(57)

ABSTRACT

A mobile terminal is provided including a display unit; a middle frame including a supporting unit that supports a rear surface of the display unit with a side portion around the supporting portion; a main board at a rear surface of the middle frame including a ground; a first wireless communication unit in the main board to transceive a first signal; a second wireless communication unit in the main board to transceive a second signal; and a rear case covering a rear surface of the main board, where the side portion includes a plurality of conductive members with ends divided into slits and the plurality of the conductive members includes a common antenna electrically connectable with the first and second wireless communication units to receive the first and second signals such that the mobile terminal receives different signals with antennas for LTE and 5G communication arranged in a limited space.





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(19) **United States**

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

(10) **Pub. No.: US 2019/0356045 A1**

(43) **Pub. Date: Nov. 21, 2019**

(54) **ANTENNA AND MOBILE TERMINAL**

(71) Applicant: **Huawei Device Co., LTD.**, Dongguan (CN)

(72) Inventors: **Dong Yu**, Shanghai (CN); **Hanyang Wang**, Reading (GB); **Jianming Li**, Shanghai (CN)

(21) Appl. No.: **16/526,450**

(22) Filed: **Jul. 30, 2019**

Related U.S. Application Data

(63) Continuation of application No. 15/112,635, filed on Jul. 19, 2016, now Pat. No. 10,403,971, which is a continuation of application No. PCT/CN2015/072406, filed on Feb. 6, 2015.

(30) **Foreign Application Priority Data**

Feb. 12, 2014 (CN) 201410049186.X

Publication Classification

(51) **Int. Cl.**
H01Q 1/38 (2006.01)
H01Q 5/378 (2006.01)

H01Q 5/371 (2006.01)

H01Q 5/328 (2006.01)

H01Q 1/48 (2006.01)

H01Q 5/335 (2006.01)

H01Q 9/42 (2006.01)

H01Q 7/00 (2006.01)

H01Q 1/24 (2006.01)

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

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

5/328 (2015.01); **H01Q 1/243** (2013.01);

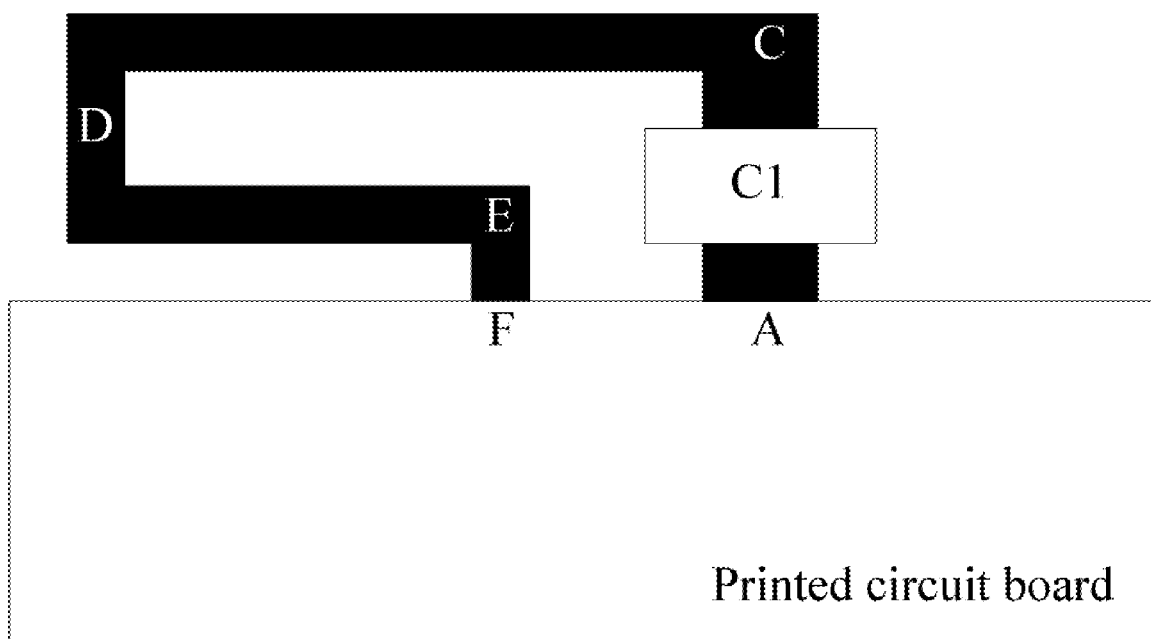
H01Q 5/335 (2015.01); **H01Q 9/42** (2013.01);

H01Q 7/00 (2013.01); **H01Q 1/48** (2013.01)

(57)

ABSTRACT

An antenna includes a first radiator and a first capacitor structure. A first end of the first radiator is electrically connected to a signal feed end of a printed circuit board by means of the first capacitor structure, and a second end of the first radiator is electrically connected to a ground end of the printed circuit board. The first radiator, the first capacitor structure, the signal feed end, and the ground end form a first antenna configured to produce a first resonance frequency. An electrical length of the first radiator is greater than one eighth of a wavelength corresponding to the first resonance frequency, and the electrical length of the first radiator is less than a quarter of the wavelength corresponding to the first resonance frequency.





US 20190363426A1

(19) **United States**(12) **Patent Application Publication**
SU(10) **Pub. No.: US 2019/0363426 A1**(43) **Pub. Date: Nov. 28, 2019**(54) **TERMINAL HOUSING AND TERMINAL****H01Q 1/48** (2006.01)**H01Q 1/38** (2006.01)(71) Applicant: **Beijing Xiaomi Mobile Software Co., Ltd.**, Beijing (CN)(52) **U.S. Cl.**CPC **H01Q 1/243** (2013.01); **H01Q 1/38** (2013.01); **H01Q 1/48** (2013.01); **H04M 1/0249** (2013.01)(72) Inventor: **Jinhuai SU**, Beijing (CN)(73) Assignee: **Beijing Xiaomi Mobile Software Co., Ltd.**, Beijing (CN)

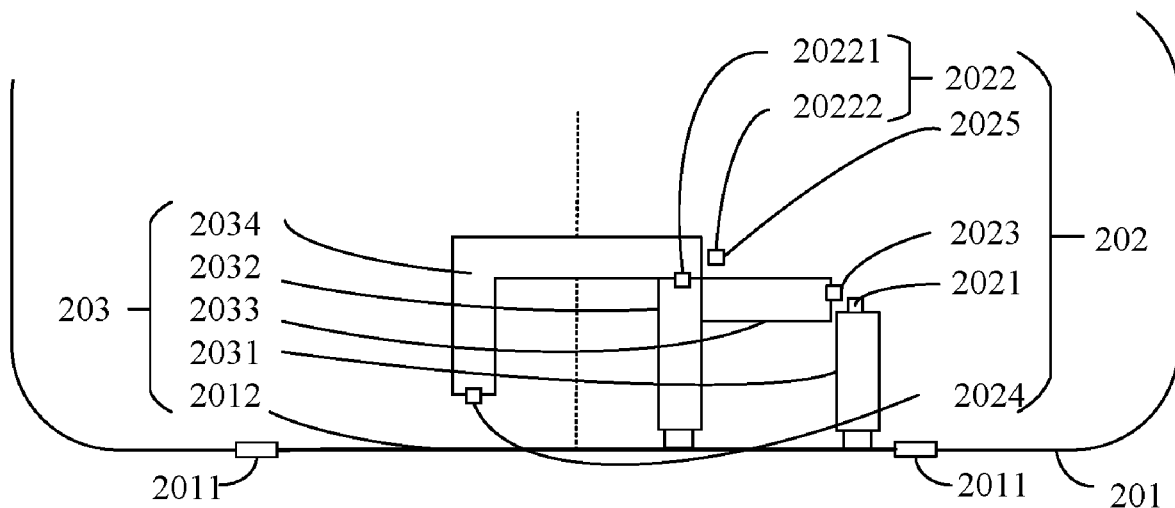
(57)

ABSTRACT

The present disclosure provides a terminal housing and a terminal. The main board unit in the terminal housing includes a power supply module, a switching module, a first grounding area, a second grounding area and a third grounding area; the antenna unit includes a horizontal bezel, a first branch, a second branch, a third branch and a fourth branch; the power supply module is connected to the horizontal bezel through the first branch; the first end of the switching module is connected to the contact area of the second branch, the third branch, and the fourth branch, the second end of the switching module is connected to the third grounding area, and the switching module is configured to control the first end to be connected to or disconnected from the second end.

(21) Appl. No.: **16/384,924**(22) Filed: **Apr. 16, 2019**(30) **Foreign Application Priority Data**

May 28, 2018 (CN) 201810525028.5

Publication Classification(51) **Int. Cl.****H01Q 1/24** (2006.01)**H04M 1/02** (2006.01)



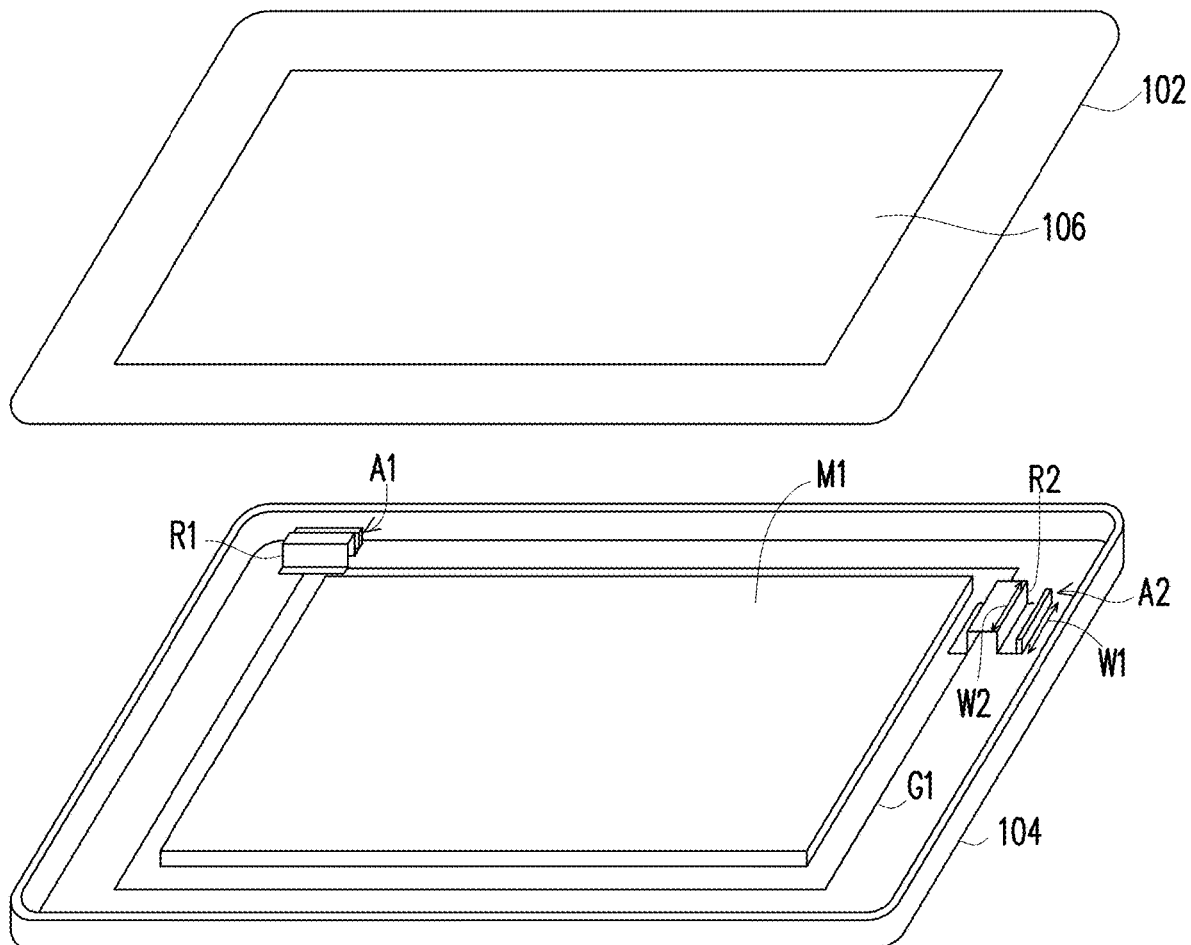
US 20190363436A1

(19) **United States**(12) **Patent Application Publication**
Wu et al.(10) **Pub. No.: US 2019/0363436 A1**(43) **Pub. Date: Nov. 28, 2019**(54) **COMMUNICATION APPARATUS****Publication Classification**(71) Applicant: **PAGATRON CORPORATION**, Taipei
City (TW)(72) Inventors: **Chien-Yi Wu**, Taipei City (TW);
Huan-Chia Chang, Taipei City (TW);
Chao-Hsu Wu, Taipei City (TW);
Shih-Keng Huang, Taipei City (TW);
Chia-Chou Tsai, Taipei City (TW);
Yu-Yi Chu, Taipei City (TW)(51) **Int. Cl.**
H01Q 1/52 (2006.01)
H05K 5/00 (2006.01)
H05K 9/00 (2006.01)
H01Q 1/24 (2006.01)
H01Q 1/22 (2006.01)(52) **U.S. Cl.**
CPC **H01Q 1/528** (2013.01); **H05K 5/0017**
(2013.01); **G06F 1/1656** (2013.01); **H01Q**
1/243 (2013.01); **H01Q 1/2266** (2013.01);
H05K 9/0054 (2013.01)(73) Assignee: **PAGATRON CORPORATION**, Taipei
City (TW)(21) Appl. No.: **16/363,893**(22) Filed: **Mar. 25, 2019**(30) **Foreign Application Priority Data**

May 25, 2018 (TW) 107118031

(57) **ABSTRACT**

A communication apparatus is provided. A retaining wall structure electrically connected with a ground plane is disposed between a main circuit board and an antenna. A retaining wall part of the retaining wall structure has a thickness. A distance between the retaining wall part and the main circuit board is a first distance, and a distance between the retaining wall part and the antenna and is a second distance. A distance between the retaining wall and a shielding metal plate is a third distance. The projection of the antenna projected toward the retaining wall in the orthogonal projection direction falls on the retaining wall part.





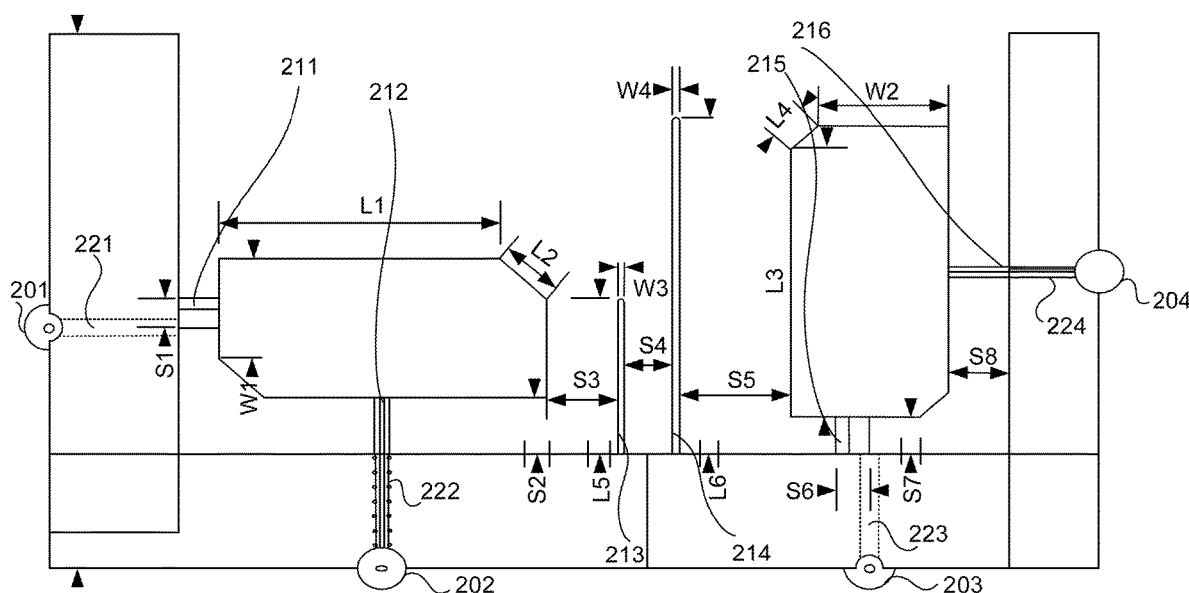
US 20190363455A1

(19) **United States**(12) **Patent Application Publication**
YESIL et al.(10) **Pub. No.: US 2019/0363455 A1**(43) **Pub. Date: Nov. 28, 2019**(54) **METHOD AND APPARATUS FOR
MULTI-FEED MULTI-BAND MIMO
ANTENNA SYSTEM****Publication Classification**(51) **Int. Cl.****H01Q 21/24** (2006.01)**H01Q 5/30** (2006.01)**H01Q 1/52** (2006.01)(52) **U.S. Cl.**CPC **H01Q 21/24** (2013.01); **H01Q 1/521**
(2013.01); **H01Q 5/30** (2015.01)(71) Applicant: **Airties Kablosuz Iletisim Sanayi Ve
Dis Ticaret A.S.**, Istanbul (TR)(72) Inventors: **Mehmet Ali YESIL**, Istanbul (TR);
Emre AYDIN, Istanbul (TR); **Ali
ARSAL**, Istanbul (TR)(73) Assignee: **Airties Kablosuz Iletisim Sanayi Ve
Dis Ticaret A.S.**, Istanbul (TR)(57) **ABSTRACT**(21) Appl. No.: **16/479,537**(22) PCT Filed: **Jan. 25, 2018**(86) PCT No.: **PCT/IB2018/000130**

§ 371 (c)(1),

(2) Date: **Jul. 19, 2019****Related U.S. Application Data**(60) Provisional application No. 62/450,359, filed on Jan.
25, 2017.

According to aspects of the disclosure, a multi-feed multi-band MIMO antenna system comprises at least two antennas orthogonally positioned with respect to each other, which are operating over two different frequency ranges; at least two out-of-band resonators coupled with the two antennas respectively; and, at least two other in-band resonators coupled with the two antennas respectively and designed to decrease mutual coupling in the frequency ranges, where the first resonator filters out signals having the second frequency range leaking into a first antenna, while the second resonator filters out other signals having the first frequency range leaking into a second antenna.





US 20190372201A1

(19) **United States**(12) **Patent Application Publication****Zhu et al.**(10) **Pub. No.: US 2019/0372201 A1**(43) **Pub. Date: Dec. 5, 2019**(54) **ANTENNA STRUCTURE AND COMMUNICATIONS TERMINAL****H01Q 1/52** (2006.01)**H01Q 5/335** (2006.01)(71) Applicant: **Huawei Technologies Co., Ltd.**,
Shenzhen (CN)(52) **U.S. Cl.**CPC **H01Q 1/243** (2013.01); **H01Q 5/335**
(2015.01); **H01Q 1/521** (2013.01); **H01Q 1/48**
(2013.01)(72) Inventors: **Wei Zhu**, Shenzhen (CN); **Yi Wang**,
Xi'an (CN); **Kun Li**, Xi'an (CN); **Silei**
Huyan, Xi'an (CN); **Yun Zhang**, Xi'an
(CN); **Bao Lu**, Shenzhen (CN);
Shiqiang Lu, Xi'an (CN)

(57)

ABSTRACT(21) Appl. No.: **16/478,351**(22) PCT Filed: **Jul. 4, 2017**(86) PCT No.: **PCT/CN2017/091699**

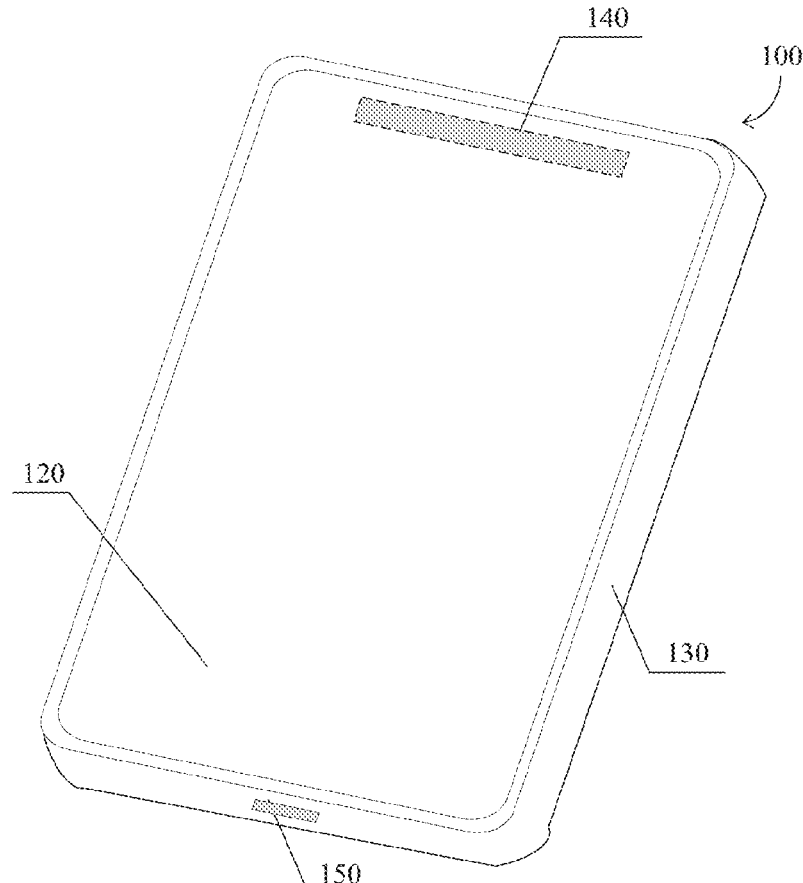
§ 371 (c)(1),

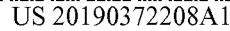
(2) Date: **Jul. 16, 2019**(30) **Foreign Application Priority Data**

Jan. 16, 2017 (CN) 201710038272.4

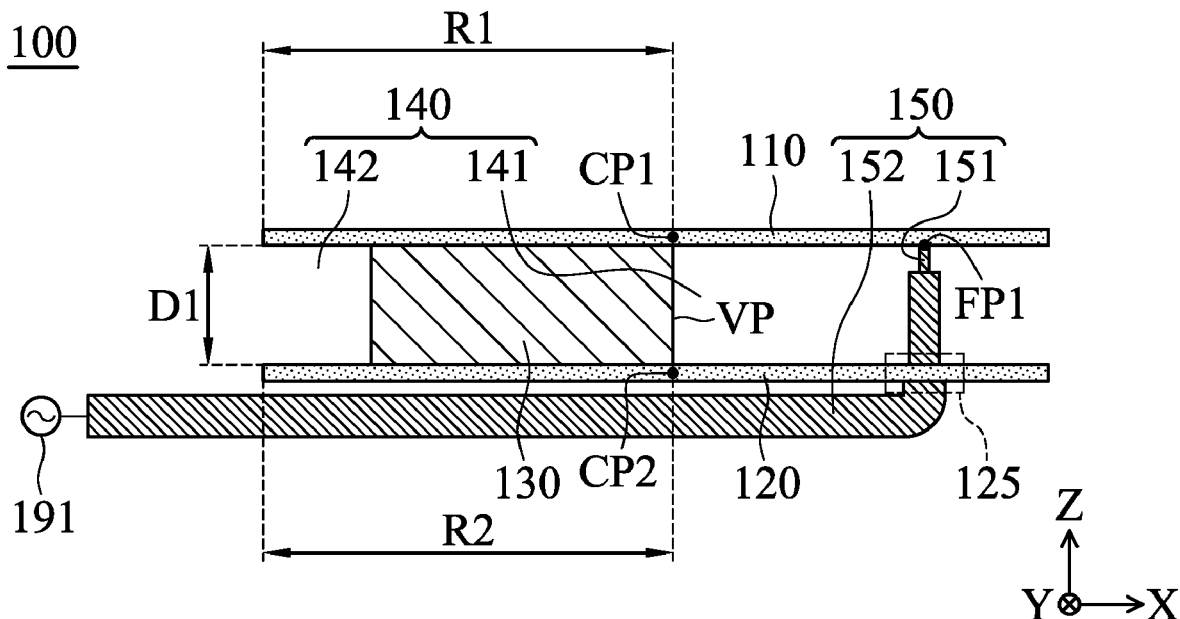
Publication Classification(51) **Int. Cl.****H01Q 1/24** (2006.01)**H01Q 1/48** (2006.01)

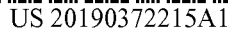
A communications terminal includes an antenna structure and a metallic frame that includes at least one slot. The antenna structure includes an NFC antenna and a non-NFC antenna. The NFC antenna includes an NFC radiator, a first filtering unit, and an NFC circuit, and the non-NFC antenna includes a non-NFC radiator, a second filtering unit, and a non-NFC circuit. The NFC radiator and the non-NFC radiator are formed by the metallic frame of the communications terminal, and the entire non-NFC radiator is in the NFC radiator. The NFC circuit is coupled to the NFC radiator by using the first filtering unit, the non-NFC circuit is coupled to the non-NFC radiator by using the second filtering unit, the first filtering unit is configured to filter out a non-NFC signal, and the second filtering unit is configured to filter out an NFC signal.





(43) **Pub. Date:** **Dec. 5, 2019**



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

(43) **Pub. Date:** **Dec. 5, 2019**

(52) U.S. Cl.

CPC *H01Q 1/523* (2013.01); *H01Q 5/35*
(2015.01); *H01Q 1/48* (2013.01)

(57) **ABSTRACT**

An antenna structure includes a substrate, a first antenna disposed on the substrate, a second antenna disposed on the substrate, a grounding member, a first feeding member and a second feeding member. The first antenna includes a first radiation portion, a second radiation portion, a first fed-in portion, and a first grounding portion spaced from the second radiation portion by a first gap. The second antenna includes a third radiation portion, a fourth radiation portion, a second fed-in portion and a second grounding portion spaced from the fourth radiation portion by a second gap. The first feeding member includes a first feed end coupled to the first fed-in portion and a first ground end coupled to the grounding member. The second feeding member includes a second feed end coupled to the second fed-in portion and a second ground end coupled to the grounding member.

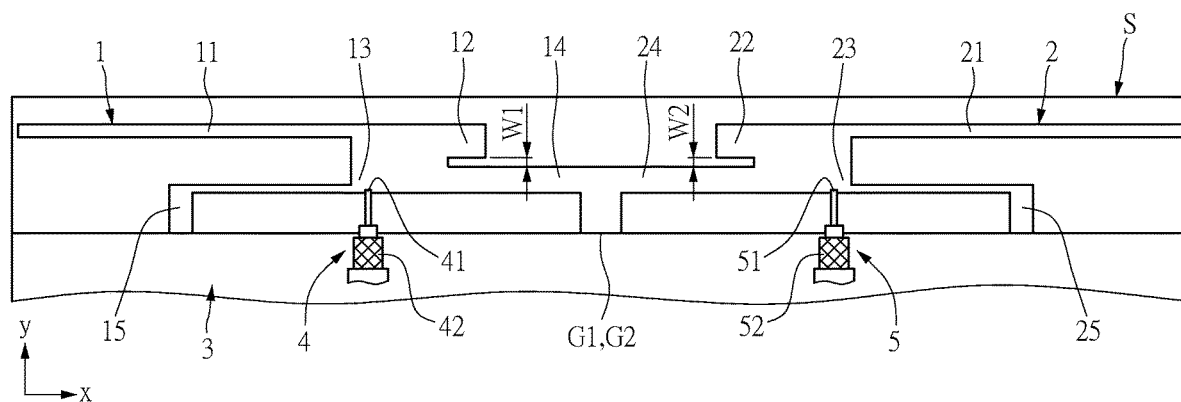
(22) Filed: **Dec. 10, 2018**

(30) **Foreign Application Priority Data**

May 30, 2018 (TW) 107118508

Publication Classification

(51) **Int. Cl.**
H01Q 1/52 (2006.01)
H01Q 1/48 (2006.01)
H01Q 5/35 (2006.01)





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(19) **United States**(12) **Patent Application Publication**
WU(10) **Pub. No.: US 2019/0372224 A1**(43) **Pub. Date: Dec. 5, 2019**(54) **ANTENNA DEVICE**(71) Applicant: **LANNER ELECTRONICS INC.,**
New Taipei City (TW)(72) Inventor: **JUNG-TAI WU, Taipei City (TW)**(21) Appl. No.: **16/102,127**(22) Filed: **Aug. 13, 2018**(30) **Foreign Application Priority Data**

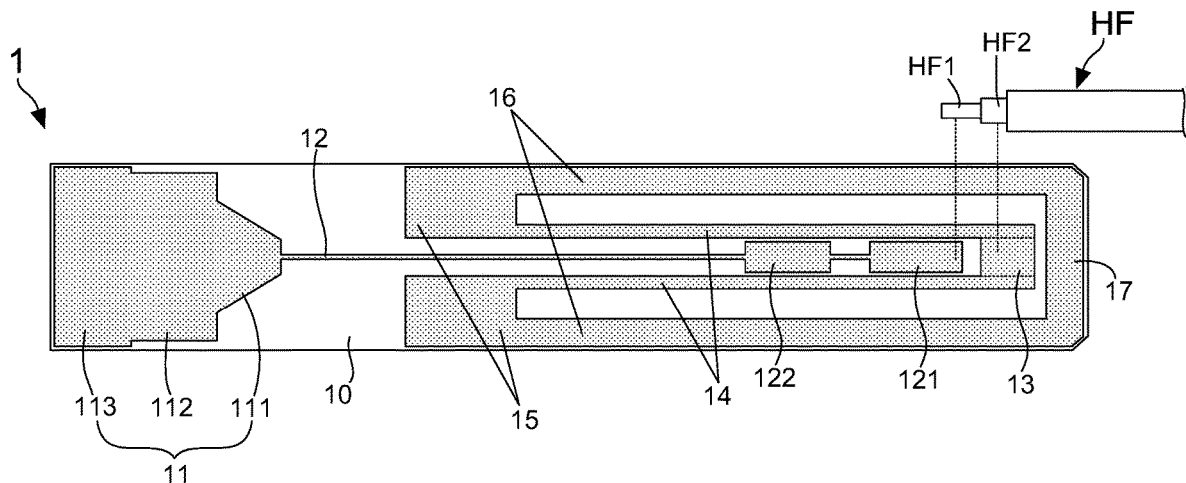
Jun. 1, 2018 (TW) 107119007

Publication Classification(51) **Int. Cl.****H01Q 5/371** (2006.01)**H01Q 3/22** (2006.01)**H01Q 1/36** (2006.01)**H01Q 1/48** (2006.01)(52) **U.S. Cl.**CPC **H01Q 5/371** (2015.01); **H01Q 1/48**
(2013.01); **H01Q 1/36** (2013.01); **H01Q 3/22**
(2013.01)

(57)

ABSTRACT

Disclosures of the present invention describe an antenna device by forming a HF conductive section, a ground electrode, two first LF conductive sections, two first bending conductive sections, two second LF conductive sections, and a second bending conductive section on one surface of a substrate as well as disposing a cover electrode on the other surface of the same substrate. The HF conductive section is designed to have an area extending portion for making a horizontal electrical coupling occur between the area extending portion and the two LF conductive sections. Moreover, the cover electrode covers a portion of the second bending conductive section, all of the ground electrode, a portion of the signal inputting portion, and a portion of the two LF conductive sections, such that a vertical electrical coupling is achieved for enhancing the efficiency of the antenna device during the transmission of LF signal.





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(19) **United States**

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

(10) **Pub. No.: US 2019/0372546 A1**

(43) **Pub. Date: Dec. 5, 2019**

(54) **WIRELESS COMMUNICATION DEVICE**

H01Q 5/335 (2006.01)

G06F 3/02 (2006.01)

(71) Applicant: **ASUSTeK COMPUTER INC.**, Taipei (TW)

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

CPC **H03H 7/40** (2013.01); **H04M 1/0277** (2013.01); **G06F 3/02** (2013.01); **H01Q 5/335** (2015.01); **H01Q 1/245** (2013.01)

(72) Inventors: **Pin-Tang CHIU**, TAIPEI (TW);
Chia-Ho LIN, TAIPEI (TW)

(21) Appl. No.: **16/417,852**

(22) Filed: **May 21, 2019**

(30) **Foreign Application Priority Data**

May 29, 2018 (CN) 201820810026.6

Publication Classification

(51) **Int. Cl.**

H03H 7/40 (2006.01)

H04M 1/02 (2006.01)

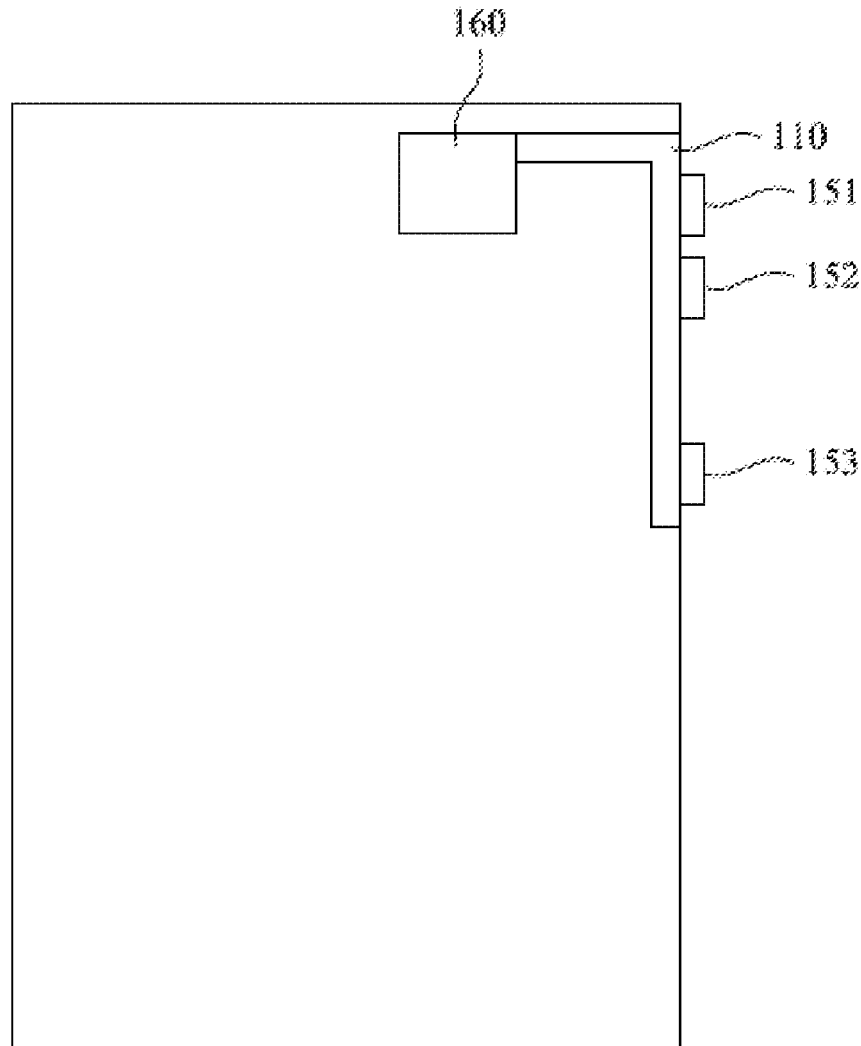
H01Q 1/24 (2006.01)

(57)

ABSTRACT

A wireless communication device is provided. The wireless communication device comprises a circuit board, a key module and a sensing module. The key module is electrically connected with at least one key through the circuit board. The sensing module is electrically connected with the circuit board, wherein the circuit board is taken as an induction conductor of the sensing module. Therefore, according to the wireless communication device disclosed by the disclosure, the functions of the key module, the sensing module and an antenna module are integrated on a same component, so that the component has three-in-one functions, and the efficiency of an antenna is further enhanced.

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(19) **United States**

(12) **Patent Application Publication**
GUO

(10) **Pub. No.: US 2019/0372635 A1**

(43) **Pub. Date: Dec. 5, 2019**

(54) **ELECTRONIC DEVICE AND ANTENNA
COMPONENT THEREOF**

H01Q 1/38 (2006.01)

H01Q 1/36 (2006.01)

(71) Applicant: **Beijing Xiaomi Mobile Software Co.,
Ltd., Beijing (CN)**

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

CPC *H04B 7/0602* (2013.01); *H04W 84/12*
(2013.01); *H01Q 1/364* (2013.01); *H01Q 1/38*
(2013.01); *H04B 1/406* (2013.01)

(72) Inventor: **Fang GUO, Beijing (CN)**

(73) Assignee: **Beijing Xiaomi Mobile Software Co.,
Ltd.**

(57)

ABSTRACT

The present disclosure relates to an electronic device and an antenna component thereof. The antenna component includes a conductive frame and a signal generation circuit. The conductive frame includes a first conductive frame section and a second conductive frame section, and a slit therebetween is configured to implement signal radiation of the antenna component. A feed point is provided on the first conductive frame section near the slit. The first conductive frame section includes an extension portion from the feed point to an end away from the slit. A groove is formed by the extension portion and a first ground element. The signal generation circuit is electronically connected to the feed point, and configured to generate an L5 band signal when a signal source is input to the signal generation circuit, such that the groove generates an L1 band signal.

(21) Appl. No.: **16/412,799**

(22) Filed: **May 15, 2019**

(30) **Foreign Application Priority Data**

May 29, 2018 (CN) 201810533925.0

Publication Classification

(51) **Int. Cl.**

H04B 7/06 (2006.01)

H04W 84/12 (2006.01)

H04B 1/403 (2006.01)

