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(19) **United States**

(12) **Patent Application Publication**
Mai

(10) **Pub. No.: US 2018/0115052 A1**

(43) **Pub. Date: Apr. 26, 2018**

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

(52) **U.S. CL.**

CPC **H01Q 1/243** (2013.01)

(71) Applicant: **Jianchun Mai**, Shenzhen (CN)

(57)

ABSTRACT

(72) Inventor: **Jianchun Mai**, Shenzhen (CN)

(73) Assignee: **AAC Technologies Pte. Ltd.**,
Singapore city (SG)

The present disclosure provides an antenna device. The antenna device includes a metal back plate, a metal frame surrounding a periphery of the metal back plate and is connected with the metal back plate, and a radiator configured to receive and radiate electromagnetic waves, the metal back plate and the radiator are spaced so as to form a gap, the gap includes a first gap provided along a short axis direction of the metal back plate and a second gap and a third gap which are bended and extend from two ends of the first gap, respectively, a length of the first gap is smaller than a width of the metal back plate along its short axis. The antenna device of the present disclosure has less influence to antenna performance when being hand-held, and the antenna radiating performance is good.

(21) Appl. No.: **15/417,195**

(22) Filed: **Jan. 26, 2017**

(30) **Foreign Application Priority Data**

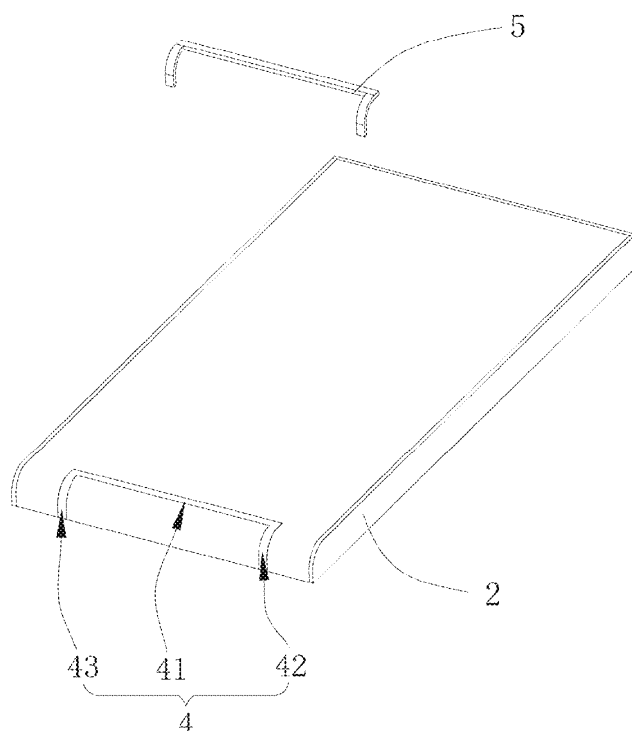
Oct. 25, 2016 (CN) 201610940525.2

Publication Classification

(51) **Int. Cl.**

H01Q 1/24 (2006.01)

200

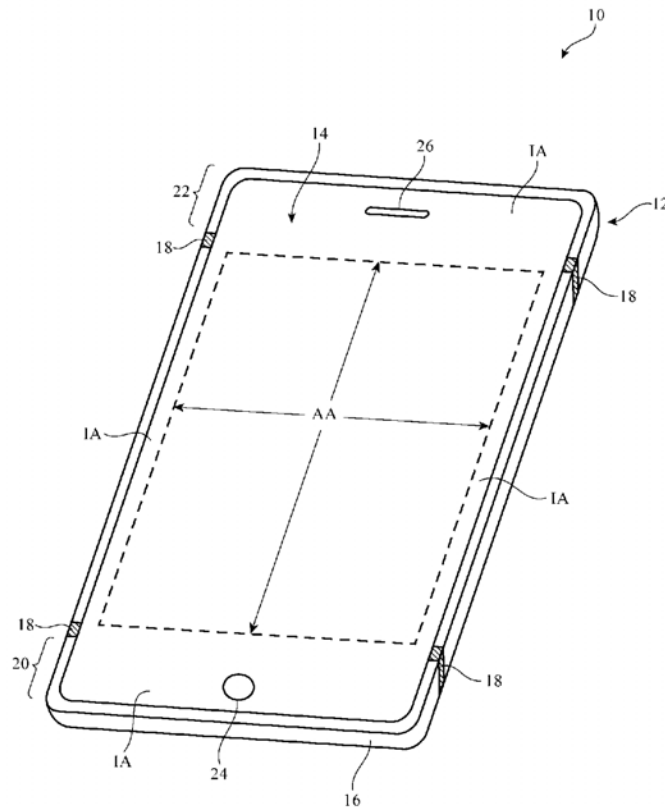




US 20180115053A1

(19) **United States**(12) **Patent Application Publication**
Hu et al.(10) **Pub. No.: US 2018/0115053 A1**(43) **Pub. Date: Apr. 26, 2018**(54) **ELECTRONIC DEVICE ANTENNA WITH
EMBEDDED PARASITIC ARM****Publication Classification**(51) **Int. Cl.****H01Q 1/24** (2006.01)**H01Q 5/357** (2006.01)**H01Q 13/10** (2006.01)(52) **U.S. Cl.**CPC **H01Q 1/243** (2013.01); **H01Q 5/357**
(2015.01); **H01Q 13/103** (2013.01)(71) Applicant: **Apple Inc.**, Cupertino, CA (US)(72) Inventors: **Hongfei Hu**, Cupertino, CA (US);
Benjamin hane Bustle, Cupertino, CA
(US); **Enrique Ayala Vazquez**,
Watsonville, CA (US); **Nanbo Jin**, San
Jose, CA (US); **Miguel Christophy**,
San Francisco, CA (US); **Erdinc Irci**,
Sunnyvale, CA (US); **Salih Yarga**,
Sunnyvale, CA (US); **Erica Tong**,
Pacifica, CA (US); **Anand**
Lakshmanan, San Jose, CA (US);
Mattia Pascolini, San Francisco, CA
(US); **Tyler Cater**, San Jose, CA (US);
Christopher T. Cheng, Sunnyvale, CA
(US)(21) Appl. No.: **15/837,873**(22) Filed: **Dec. 11, 2017****Related U.S. Application Data**(63) Continuation of application No. 14/829,008, filed on
Aug. 18, 2015, now Pat. No. 9,876,272.(57) **ABSTRACT**

An electronic device may have wireless circuitry with antennas. An antenna resonating element arm for an antenna may be formed from peripheral conductive structures running along the edges of a device housing. The peripheral conductive structures may form housing sidewalls. A slot may be machined into a metal housing that separates the housing sidewalls from a planar rear housing portion that forms a ground for an antenna. The slot may be filled with plastic filler. A parasitic antenna resonating element arm that supports an antenna resonance at high band frequencies may be embedded within the plastic filler. The parasitic antenna resonating element may be formed from a portion of the planar rear housing portion.





US 20180115067A1

(19) **United States**(12) **Patent Application Publication**
CHEN et al.(10) **Pub. No.: US 2018/0115067 A1**(43) **Pub. Date: Apr. 26, 2018**(54) **DUAL-BAND ANTENNA MODULE****H01Q 1/38** (2006.01)**H01Q 1/36** (2006.01)(71) Applicant: **UNIVERSAL SCIENTIFIC
INDUSTRIAL (SHANGHAI) CO.,
LTD.**, Shanghai (CN)(52) **U.S. Cl.**CPC **H01Q 5/307** (2015.01); **H01Q 1/2291**
(2013.01); **H01Q 1/36** (2013.01); **H01Q 1/38**
(2013.01); **H01Q 1/48** (2013.01)(72) Inventors: **HSIN-HONG CHEN**, SHANGHAI
(CN); **JUI-KUN SHIH**, SHANGHAI
(CN); **CHUN-HUAN LEE**,
SHANGHAI (CN); **JUI-CHIH
CHIEN**, SHANGHAI (CN);
CHIH-SEN HSIEH, SHANGHAI (CN)

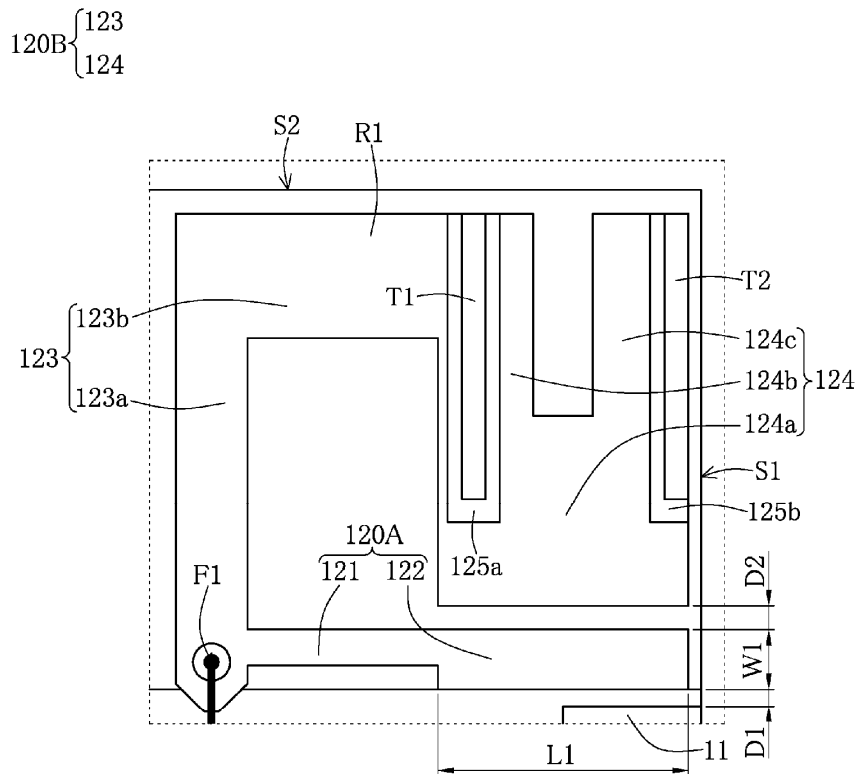
(57)

ABSTRACT

A dual-band antenna module is provided. The dual-band antenna module includes a circuit board, a ground coupling portion electrically connected to a reference ground plane of the circuit board, a first antenna, and a second antenna spaced from the first antenna. The first antenna and the ground coupling portion are disposed on the circuit board and configured to couple each other. The first antenna includes a first radiation unit, a U-shaped conductive frame, and a first feeding portion. The U-shaped conductive frame is disposed on the first radiation unit and opens toward the circuit board. The second antenna includes a second radiation unit, a high-frequency impedance portion, and a second feeding portion. The second radiation unit and the high-frequency impedance portion are respectively disposed on two opposite surfaces of the circuit board to resonate to each other. The second radiation unit includes a ground extension portion electrically grounded.

(21) Appl. No.: **15/386,598**(22) Filed: **Dec. 21, 2016**(30) **Foreign Application Priority Data**

Oct. 21, 2016 (CN) 201610919775.8

Publication Classification(51) **Int. Cl.****H01Q 5/307** (2006.01)**H01Q 1/22** (2006.01)**H01Q 1/48** (2006.01)



US 20180115069A1

(19) **United States**(12) **Patent Application Publication****MAI et al.**(10) **Pub. No.: US 2018/0115069 A1**(43) **Pub. Date: Apr. 26, 2018**(54) **ANTENNA ASSEMBLY AND MOBILE TERMINAL**(71) Applicants: **JianChun MAI**, Shenzhen (CN);
HuiYing LU, Shenzhen (CN)(72) Inventors: **JianChun MAI**, Shenzhen (CN);
HuiYing LU, Shenzhen (CN)(73) Assignee: **AAC Technologies Pte. Ltd.**,
Singapore (SG)(21) Appl. No.: **15/417,116**(22) Filed: **Jan. 26, 2017**(30) **Foreign Application Priority Data**

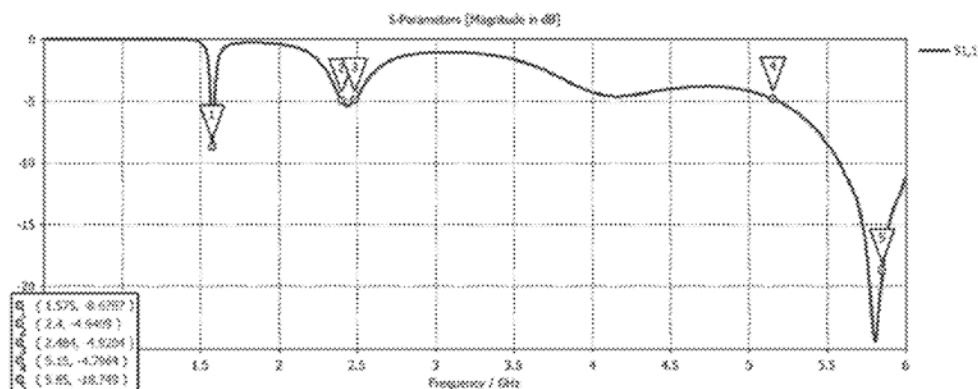
Oct. 25, 2016 (CN) 201610938166.7

Publication Classification(51) **Int. Cl.**
H01Q 5/50 (2006.01)
H01Q 1/48 (2006.01)
H01Q 5/30 (2006.01)
H04W 88/06 (2006.01)**H01Q 9/42** (2006.01)**H01Q 1/22** (2006.01)(52) **U.S. Cl.**CPC **H01Q 5/50** (2015.01); **H01Q 1/48**
(2013.01); **H01Q 1/2291** (2013.01); **H04W**
88/06 (2013.01); **H01Q 9/42** (2013.01); **H01Q**
5/30 (2015.01)

(57)

ABSTRACT

The present disclosure provides an antenna assembly, including a metal back cover with a completely closed metal edge frame, and a circuit board provided in the metal back cover, the metal edge frame is provided with a gap along a circumferential direction of the metal edge frame; the circuit board is provided with a matching circuit, a headroom region is provided between the matching circuit and the metal edge frame, the matching circuit includes a grounding point and a feeding point which are electrically connected with the metal edge frame, respectively; the matching circuit and the gap form a three-in-one antenna, which includes GPS antenna, WIFI-2.4G antenna and WIFI-5G antenna, respectively. In the antenna assembly provided by the present disclosure, even the gap is provided on the metal edge frame, the requirements on strength of the metal back cover can also be met, thereby guaranteeing resistance on knocking.





(12) **Patent Application Publication**
Sakurai

(43) **Pub. Date:** Apr. 26, 2018

H01Q 1/24 (2006.01)

(52) **U.S. Cl.**
CPC *H01Q 9/285* (2013.01); *H01Q 1/242*
(2013.01); *H01Q 1/38* (2013.01); *H01Q*
21/0006 (2013.01)

(73) Assignee: **Tyco Electronics Japan G.K.**,
Kanagawa (JP)

(22) Filed: **Oct. 20, 2017**

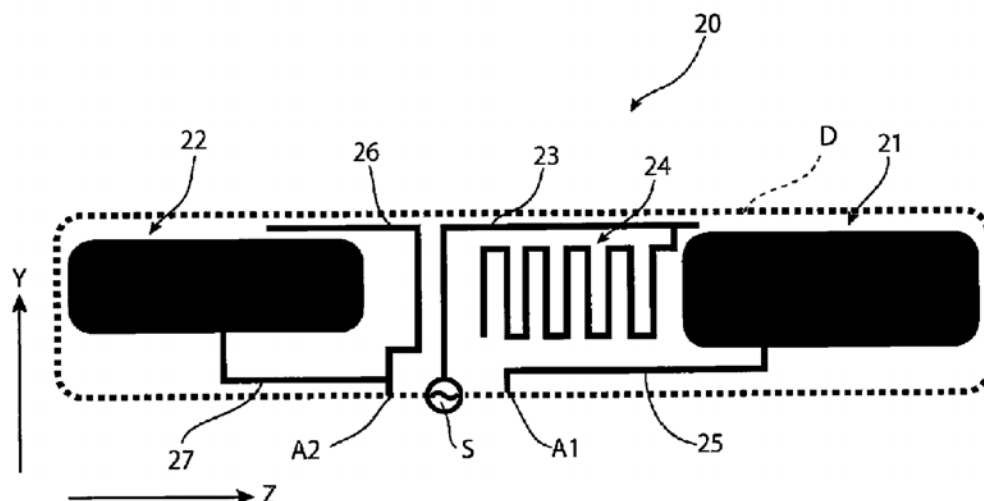
Oct. 21, 2016 (JP) 2016-206636

Publication Classification

(51) **Int. Cl.**
H01Q 9/28 (2006.01)
H01Q 21/00 (2006.01)

(57) **ABSTRACT**

An antenna comprises a first pad, a second pad, a radiating element, a meandering element, and a third pad disposed in an antenna region on a circuit board. The first pad and the second pad are spaced apart and disposed at opposite ends of the antenna region. The radiating element is disposed between the first pad and the second pad and is capacitively coupled to the first pad. The meandering element is connected to the radiating element at a position adjacent the first pad. The meandering element extends in the first direction away from the first pad while meandering reciprocally in the second direction. The third pad is capacitively coupled to the second pad.





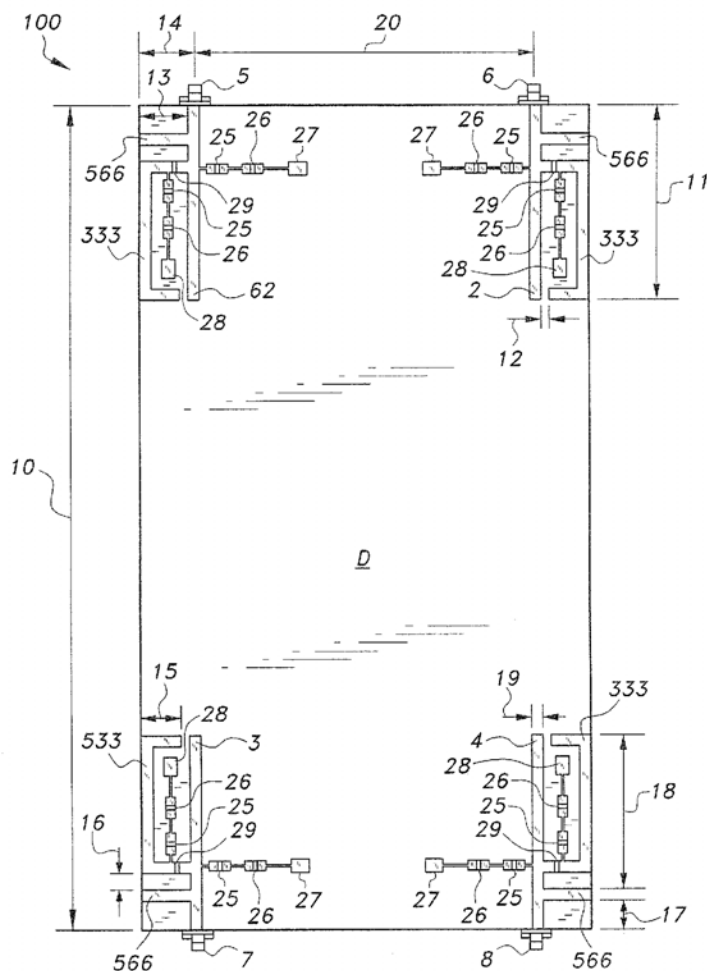
US 20180115080A1

(19) **United States**(12) **Patent Application Publication**
HUSSAIN et al.(10) **Pub. No.: US 2018/0115080 A1**(43) **Pub. Date: Apr. 26, 2018**(54) **WIDE BAND FREQUENCY AGILE MIMO ANTENNA***H01Q 1/38* (2006.01)*H01Q 1/48* (2006.01)(71) Applicant: **KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS, DHAHRAN (SA)**(52) **U.S. Cl.**CPC *H01Q 13/106* (2013.01); *H01Q 1/48* (2013.01); *H01Q 1/38* (2013.01); *H01Q 21/00* (2013.01)(72) Inventors: **RIFAQAT HUSSAIN, DHAHRAN (SA); MOHAMMAD S. SHARAWI, DHAHRAN (SA)**

(57)

ABSTRACT

The wide band frequency agile MIMO antenna is a 4-element, reconfigurable multi-input multi-output (MIMO) antenna system. Frequency agility in the design is achieved using varactor diodes tuned for various capacitance loadings. The MIMO antennas operate over a wide band, covering several well-known wireless standards between 1610-2710 MHz. The present design is simple in structure with low profile antenna elements. The design is prototyped on commercial plastic material with board dimensions 60×100×0.8 mm³ and is highly suitable to be used in frequency reconfigurable and cognitive radio based wireless handheld devices.

(21) Appl. No.: **15/333,157**(22) Filed: **Oct. 24, 2016****Publication Classification**(51) **Int. Cl.***H01Q 13/10* (2006.01)*H01Q 21/00* (2006.01)



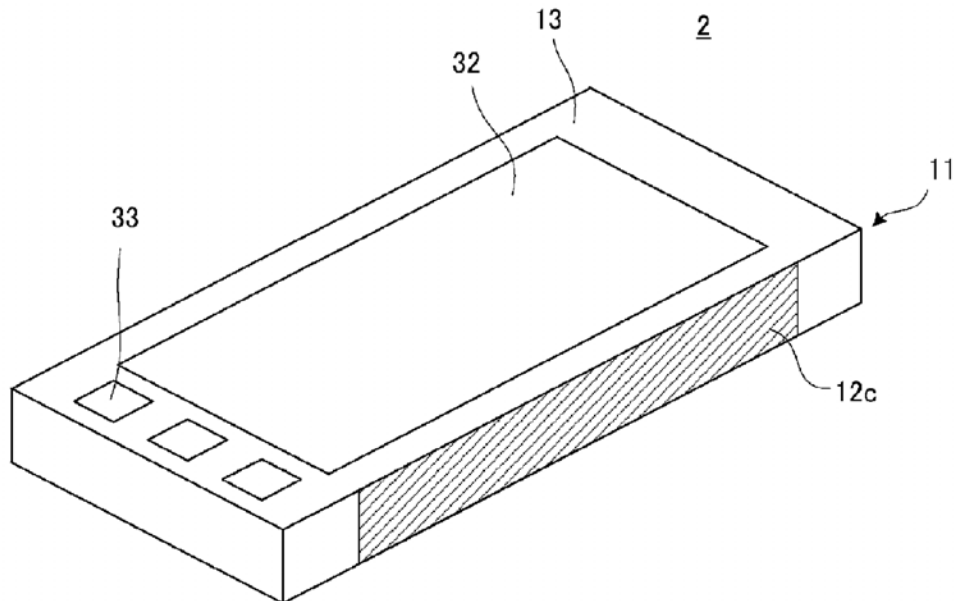
US 20180123223A1

(19) **United States**(12) **Patent Application Publication**
NAKANO et al.(10) **Pub. No.: US 2018/0123223 A1**(43) **Pub. Date: May 3, 2018**(54) **ANTENNA DEVICE AND ELECTRONIC
APPARATUS INCLUDING ANTENNA
DEVICE**(71) Applicant: **Murata Manufacturing Co., Ltd.**,
Nagaokakyo-shi (JP)(72) Inventors: **Shinichi NAKANO**, Nagaokakyo-shi
(JP); **Masahiro OZAWA**,
Nagaokakyo-shi (JP); **Nobuhito
TSUBAKI**, Nagaokakyo-shi (JP)(21) Appl. No.: **15/843,105**(22) Filed: **Dec. 15, 2017****Related U.S. Application Data**(63) Continuation of application No. 15/257,982, filed on
Sep. 7, 2016, now Pat. No. 9,876,275, which is a
continuation of application No. 14/278,080, filed on
May 15, 2014, now Pat. No. 9,466,871, which is a
continuation of application No. PCT/JP2013/074477,
filed on Sep. 11, 2013.(30) **Foreign Application Priority Data**Sep. 26, 2012 (JP) 2012-211709
Jul. 5, 2013 (JP) 2013-141969**Publication Classification**(51) **Int. Cl.****H01Q 1/24** (2006.01)
H01Q 13/10 (2006.01)
H04B 5/00 (2006.01)
H01Q 1/50 (2006.01)
H01Q 1/36 (2006.01)
H04M 1/02 (2006.01)(52) **U.S. Cl.**CPC **H01Q 1/243** (2013.01); **H01Q 13/10**
(2013.01); **H04B 5/0031** (2013.01); **H04M**
1/0202 (2013.01); **H01Q 1/50** (2013.01);
H01Q 1/36 (2013.01); **H01Q 1/241** (2013.01)

(57)

ABSTRACT

An antenna device includes a casing including a metal casing portion and a feed coil. The metal casing portion includes a main surface, a side surface connected to the main surfaces, and a notch portion located in the side surface. The feed coil is disposed inside the casing to be coupled with the metal casing portion by a magnetic field, and includes a winding central portion forming a coil opening portion. The feed coil is disposed near the notch portion, with the coil opening portion directed to a region including the notch portion.





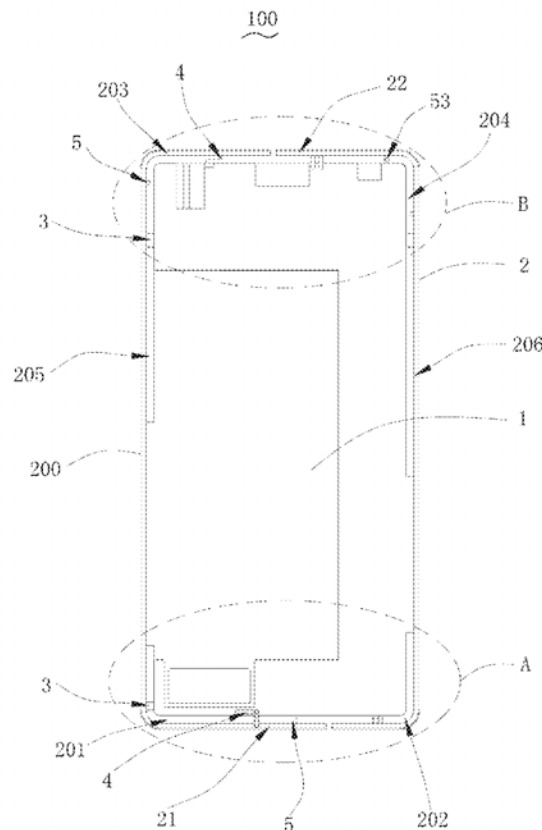
US 20180123234A1

(19) **United States**(12) **Patent Application Publication**
Wang et al.(10) **Pub. No.: US 2018/0123234 A1**(43) **Pub. Date: May 3, 2018**(54) **ANTENNA SYSTEM**(52) **U.S. Cl.**CPC **H01Q 1/48** (2013.01); **H01Q 1/2291**
(2013.01)(71) Applicants: **Chao Wang**, Shenzhen (CN); **Yongli Chen**, Shenzhen (CN); **Ya Wang**, Shenzhen (CN)(72) Inventors: **Chao Wang**, Shenzhen (CN); **Yongli Chen**, Shenzhen (CN); **Ya Wang**, Shenzhen (CN)(73) Assignee: **AAC Technologies Pte. Ltd.**, Singapore city (SG)(21) Appl. No.: **15/417,199**(22) Filed: **Jan. 26, 2017**(30) **Foreign Application Priority Data**

Oct. 27, 2016 (CN) 201610974435.5

Publication Classification(51) **Int. Cl.**
H01Q 1/48 (2006.01)
H01Q 1/22 (2006.01)(57) **ABSTRACT**

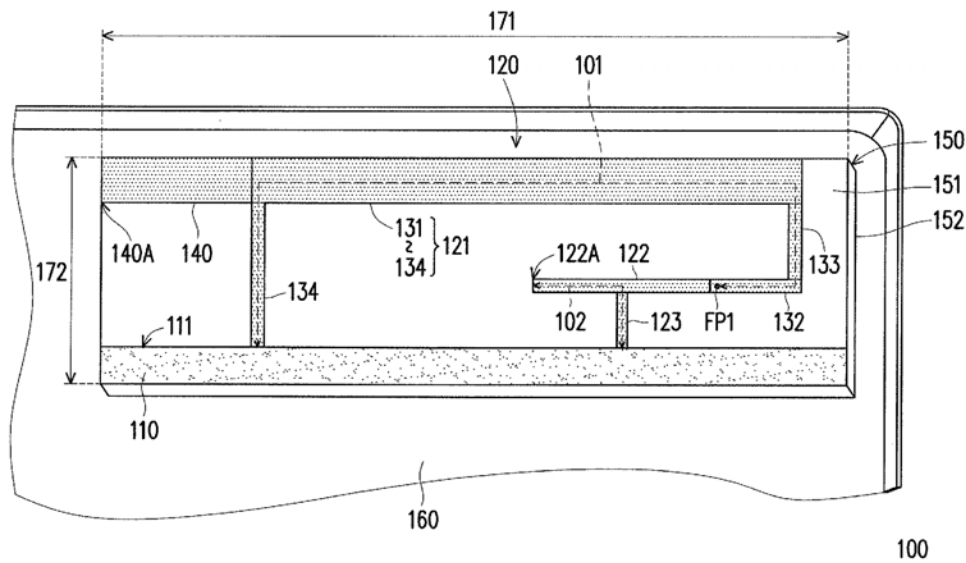
Provided is an antenna system, including a system ground unit, a metal back cover, a frame as antenna radiator, and a grounding circuit, a feeding circuit and a tuning switch, the antenna radiator includes a main radiator and an auxiliary radiator; the main radiator includes a first main radiator which forms, together with the metal back cover, a first main gap, a second main radiator extending from the first main radiator and forms, together with the metal back cover, a second main gap, and a first fracture separating the first main radiator into two parts; the auxiliary radiator includes a first auxiliary radiator which forms, together with the metal back cover, a first auxiliary gap, a second auxiliary radiator extending from the first auxiliary radiator and forms, together with the metal back cover, a second auxiliary gap, and a second fracture separating the first auxiliary radiator into two parts.





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

(43) **Pub. Date:** **May 10, 2018**





US 20180131077A1

(19) **United States**(12) **Patent Application Publication**
KANG et al.(10) **Pub. No.: US 2018/0131077 A1**(43) **Pub. Date: May 10, 2018**(54) **MOBILE TERMINAL**(71) Applicant: **LG ELECTRONICS INC.**, Seoul
(KR)(72) Inventors: **Yunmo KANG**, Seoul (KR); **Kangjae JUNG**, Seoul (KR); **Sungjoon HONG**, Seoul (KR); **Byungwoon JUNG**, Seoul (KR); **Sungjung RHO**, Seoul (KR)(73) Assignee: **LG ELECTRONICS INC.**, Seoul
(KR)(21) Appl. No.: **15/860,427**(22) Filed: **Jan. 2, 2018***H01Q 9/26* (2006.01)*H01Q 13/10* (2006.01)*H01Q 5/35* (2006.01)*H01Q 1/50* (2006.01)*H01Q 1/48* (2006.01)*H01Q 7/00* (2006.01)*H01Q 21/30* (2006.01)*H01Q 1/38* (2006.01)(52) **U.S. Cl.**CPC *H01Q 1/243* (2013.01); *H01Q 5/50* (2015.01); *H01Q 9/26* (2013.01); *H01Q 13/10* (2013.01); *H01Q 1/38* (2013.01); *H01Q 1/50* (2013.01); *H01Q 1/48* (2013.01); *H01Q 7/00* (2013.01); *H01Q 21/30* (2013.01); *H01Q 5/35* (2015.01)**Related U.S. Application Data**

(63) Continuation of application No. 14/010,900, filed on Aug. 27, 2013, now Pat. No. 9,871,286.

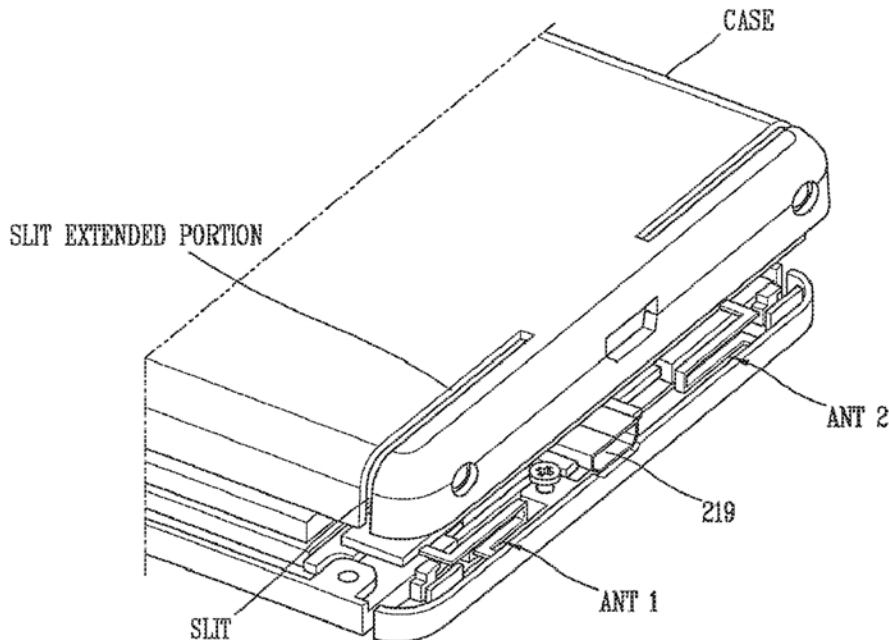
(57)

ABSTRACT(30) **Foreign Application Priority Data**

Sep. 19, 2012 (KR) 10-2012-0104152

Publication Classification(51) **Int. Cl.***H01Q 1/24* (2006.01)*H01Q 5/50* (2006.01)

A mobile terminal comprises: a terminal body; and a first antenna device and a second antenna device disposed at one side of the terminal body in an adjacent manner, and formed to operate at different frequency bands, wherein the first antenna device and the second antenna device are provided with conductive members each having a slit at one side thereof, and wherein the conductive members form part of an appearance of the terminal body.





US 20180131082A1

(19) **United States**

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

(10) **Pub. No.: US 2018/0131082 A1**

(43) **Pub. Date: May 10, 2018**

(54) **PLANAR ANTENNA ASSEMBLY**

Publication Classification

(71) Applicant: **YAZAKI CORPORATION**, Tokyo
(JP)

(51) **Int. Cl.**
H01Q 1/32 (2006.01)
H01Q 9/04 (2006.01)
H01Q 1/50 (2006.01)

(72) Inventors: **Mizuki SHIRAI**, Susono-shi (JP);
Hiroki KONDO, Susono-shi (JP)

(52) **U.S. Cl.**
CPC **H01Q 1/32** (2013.01); **H05K 1/028**
(2013.01); **H01Q 1/50** (2013.01); **H01Q**
9/0407 (2013.01)

(73) Assignee: **YAZAKI CORPORATION**, Tokyo
(JP)

(21) Appl. No.: **15/690,552**

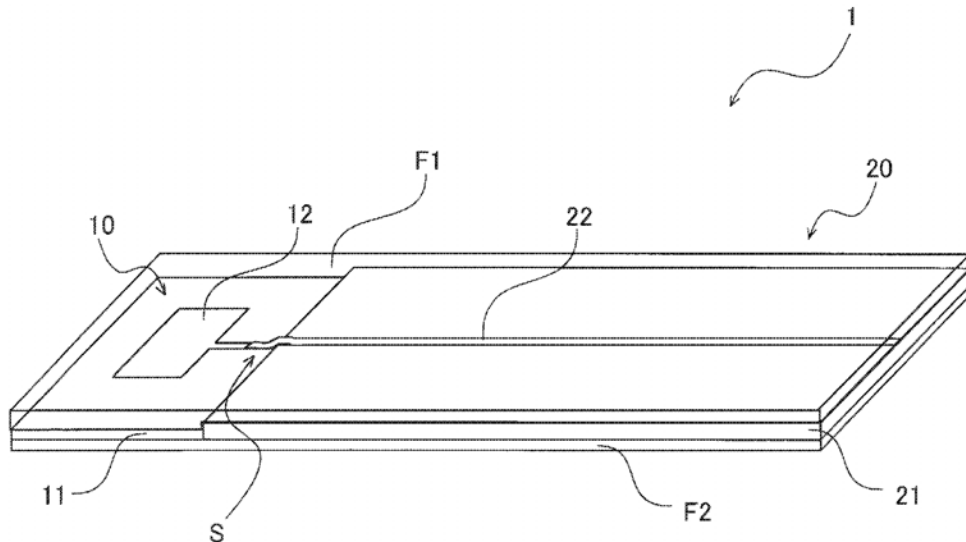
(22) Filed: **Aug. 30, 2017**

(30) **Foreign Application Priority Data**

Nov. 8, 2016 (JP) 2016-217999

(57) **ABSTRACT**

A planar antenna assembly includes an antenna and a long transmission line. The antenna is configured to receive a radio wave signal from the outside. The radio wave signal received by the antenna is transmitted through the transmission line. The antenna and the transmission line are formed in a planar shape. The transmission line includes a conductor having a thickness thicker than a thickness of the antenna.





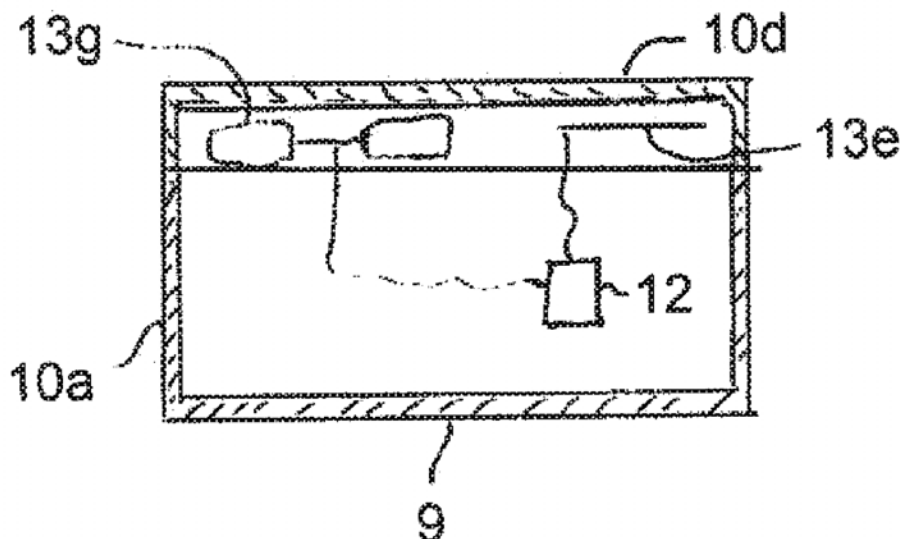
US 20180131086A1

(19) **United States**(12) **Patent Application Publication**
Frischke et al.(10) **Pub. No.: US 2018/0131086 A1**(43) **Pub. Date: May 10, 2018**(54) **MEDICAL DEVICE**(71) Applicant: **Berlin Heart GmbH**, Berlin (DE)(72) Inventors: **Michael Frischke**, Rangsdorf (DE);
Kim Peter Winterwerber, Berlin (DE)(73) Assignee: **Berlin Heart GmbH**, Berlin (DE)(21) Appl. No.: **15/710,149**(22) Filed: **Sep. 20, 2017**(30) **Foreign Application Priority Data**

Sep. 22, 2016 (EP) 16 190 243.2

Publication Classification(51) **Int. Cl.****H01Q 1/52** (2006.01)**H01Q 1/27** (2006.01)**H01Q 1/42** (2006.01)**A61M 1/10** (2006.01)(52) **U.S. Cl.**CPC **H01Q 1/526** (2013.01); **H01Q 1/273**
(2013.01); **A61M 2205/3523** (2013.01); **A61M**
1/1086 (2013.01); **H01Q 1/42** (2013.01)(57) **ABSTRACT**

A medical apparatus is provided that includes an implantable element, in particular a heart pump, and a control unit for the implantable element, which control unit is connected to the implantable element by means of a first connection. The problem of arranging an antenna of a radio module on the control unit expediently and favourably is solved in that the control unit is configured for arrangement outside the patient's body and has a predetermined orientation relative to the patient's body and has a radio module, wherein an antenna of the radio module is arranged in such a way that the region in which the patient's body is intended to be positioned, as considered from the control unit, is shielded from the antenna at least in part by electromagnetically shielding, in particular electrically conductive parts of the control unit or housing thereof.





US 20180131091A1

(19) **United States**

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

(10) **Pub. No.: US 2018/0131091 A1**

(43) **Pub. Date: May 10, 2018**

(54) **SYSTEMS AND METHODS FOR
TRANSLLOOP IMPEDANCE MATCHING OF
AN ANTENNA**

(71) Applicant: **Dell Products L.P.**, Round Rock, TX
(US)

(72) Inventors: **Ching Wei CHANG**, New Taipei City
(TW); **I-Yu CHEN**, Taipei City (TW)

(73) Assignee: **Dell Products L.P.**, Round Rock, TX
(US)

(21) Appl. No.: **15/346,784**

(22) Filed: **Nov. 9, 2016**

Publication Classification

(51) **Int. Cl.**
H01Q 5/335 (2006.01)
H01Q 1/36 (2006.01)
H01Q 7/00 (2006.01)

H01Q 9/04 (2006.01)

H01Q 1/38 (2006.01)

H01Q 1/22 (2006.01)

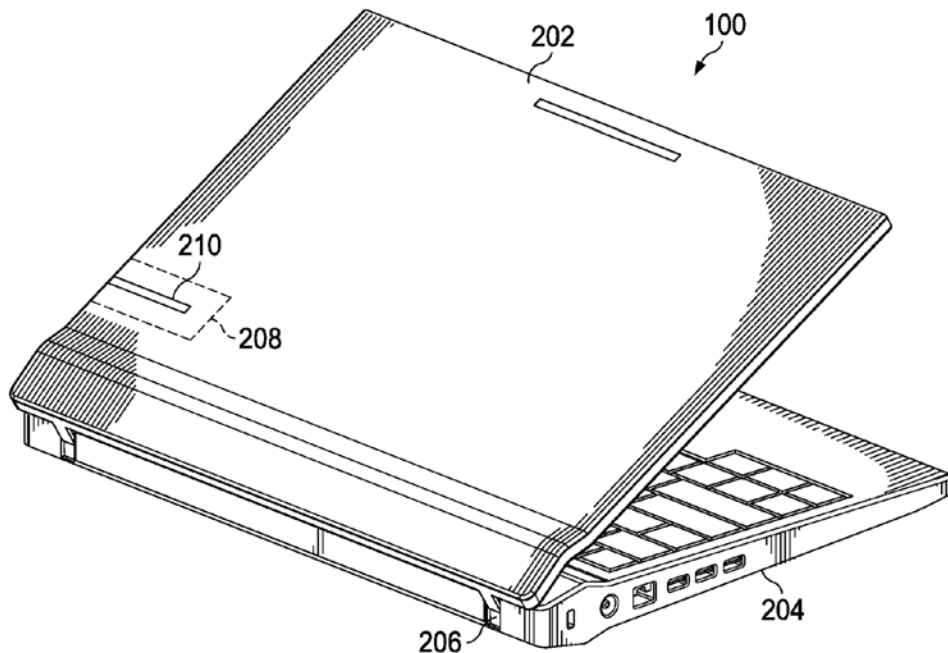
(52) **U.S. Cl.**

CPC **H01Q 5/335** (2015.01); **H01Q 1/36**
(2013.01); **H01Q 1/2258** (2013.01); **H01Q**
9/0485 (2013.01); **H01Q 1/38** (2013.01);
H01Q 7/00 (2013.01)

(57)

ABSTRACT

In accordance with embodiments of the present disclosure, an information handling system may include an enclosure for housing information handling resources of the information handling system, the enclosure having an antenna slot formed therein and formed from a material substantially different from that in which the remainder of the enclosure is formed and a circuit board mechanically coupled to the enclosure and proximate to the antenna slot, the circuit board comprising an antenna electrically coupled at two or more locations to the enclosure so as to form a loop antenna and the antenna positioned such that the antenna at least partially overlaps the antenna slot.



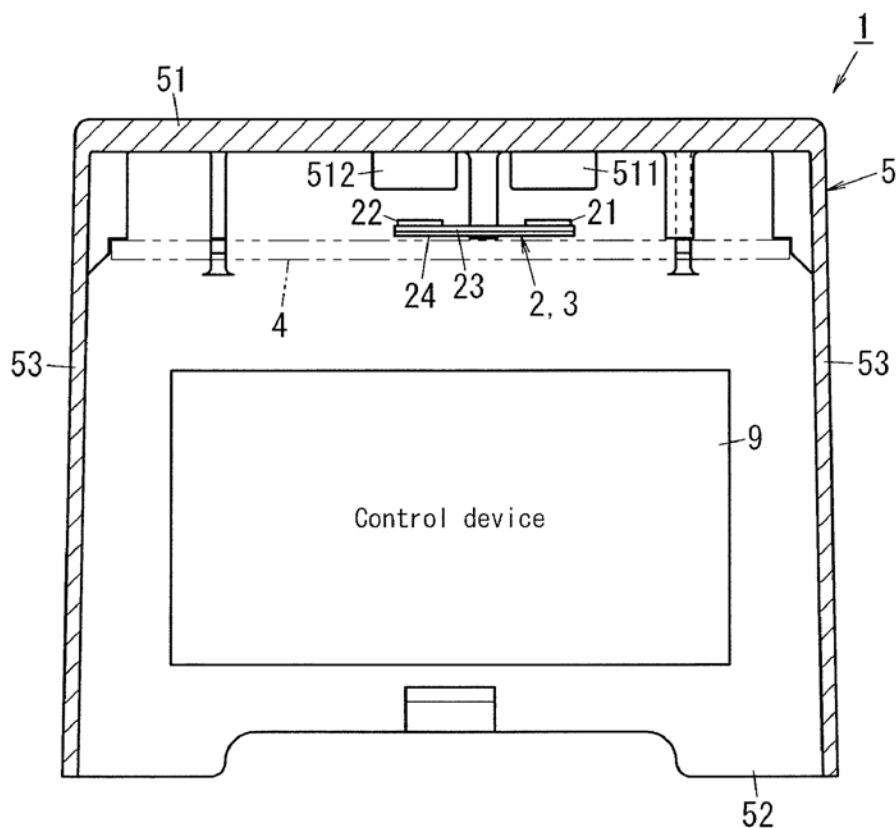


US 20180132337A1

(19) **United States**(12) **Patent Application Publication**
HONDA et al.(10) **Pub. No.: US 2018/0132337 A1**(43) **Pub. Date: May 10, 2018**(54) **RADIO WAVE SENSOR AND LUMINAIRE****Publication Classification**(71) Applicant: **PANASONIC INTELLECTUAL
PROPERTY MANAGEMENT CO.,
LTD.**, Osaka (JP)(51) **Int. Cl.**
H05B 37/02 (2006.01)
H01Q 1/12 (2006.01)(72) Inventors: **Yoshiaki HONDA**, Kyoto (JP); **Takeshi
OHNO**, Osaka (JP); **Yasuko
YAMAMOTO**, Osaka (JP); **Takaaki
UKEDA**, Osaka (JP); **Shigeo GOTOH**,
Osaka (JP)(52) **U.S. Cl.**
CPC **H05B 37/0227** (2013.01); **G01S 13/56**
(2013.01); **H01Q 1/12** (2013.01)(73) Assignee: **PANASONIC INTELLECTUAL
PROPERTY MANAGEMENT CO.,
LTD.**, Osaka (JP)(57) **ABSTRACT**(21) Appl. No.: **15/804,309**(22) Filed: **Nov. 6, 2017**(30) **Foreign Application Priority Data**

Nov. 7, 2016 (JP) 2016-217358

A radio wave sensor includes a transmitting antenna configured to radiate radio waves, a receiving antenna configured to receive incoming radio waves, and a housing that is composed of dielectric material and faces the transmitting and receiving antennas. The housing has a first part that faces the transmitting antenna, a second part that faces the receiving antenna, and a third part between the first and second parts. In a facing direction in which a bottom board of the housing faces the transmitting and receiving antennas, respective thickness of the first and second parts is thicker than thickness of the third part.





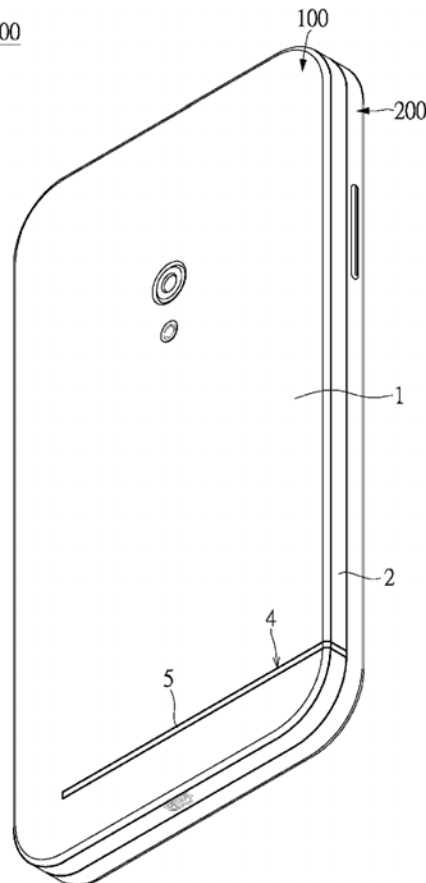
US 20180138578A1

(19) **United States**(12) **Patent Application Publication**
CHIANG(10) **Pub. No.: US 2018/0138578 A1**(43) **Pub. Date: May 17, 2018**(54) **WIRELESS COMMUNICATION DEVICE
AND ANTENNA STRUCTURE**(71) Applicant: **AUDEN TECHNO CORP.,**
TAOYUAN COUNTY (TW)(72) Inventor: **CHI-MING CHIANG,** Taoyuan
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ABSTRACT

A wireless communication device includes an electronic assembly and a rear cover fastened on the electronic assembly. A groove is recessed from an outer edge of a surrounding side plate of the rear cover. An antenna structure of the rear structure includes a dual-frequency antenna at least partially arranged on the surrounding side plate and arranged adjacent to the groove, a low-frequency selector and a high-frequency selector both connected to the dual-frequency antenna, and a switch connected between the high-frequency selector and the dual-frequency antenna. Each of the low-frequency selector and the high-frequency selector is configured to change a center frequency of the dual-frequency antenna by impedance matching. When the dual-frequency antenna is in a low-frequency mode, the switch is configured to open the connection between the high-frequency selector and the dual-frequency antenna for obstructing a parasitic capacitance effect generated from the high-frequency selector.

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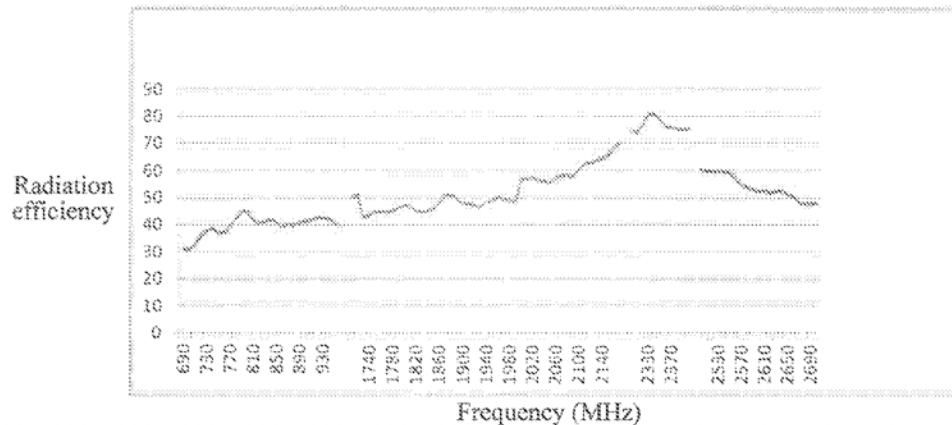
- (71) Applicant: **Huawei Technologies Co., Ltd.**,
Shenzhen, Guangdong (CN)
- (72) Inventors: **Chen Zhang**, Xi'an (CN); **Jianfei Wang**, Shenzhen (CN); **Bing Liu**, Xi'an (CN); **Shuhui Sun**, Shenzhen (CN)
- (73) Assignee: **Huawei Technologies Co., Ltd.**,
Shenzhen, Guangdong (CN)

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(57) **ABSTRACT**

An antenna apparatus includes a feeding terminal, a high-pass low-cut device, a first low-pass high-cut device, and an antenna body, where the high-pass low-cut device is electrically connected in series between a first free end of the antenna body and the feeding terminal, and the first low-pass high-cut device is electrically connected in series between a second free end of the antenna body and the feeding terminal.





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

A mobile device includes a dual band T-shaped antenna and a sensing element. The sensing element includes a first sensing part extending in first direction, a second sensing part, and a third sensing part, wherein the second sensing part and the third sensing part each includes portions that extend in a second direction that is perpendicular to the first direction. The sensing element is used to both detect proximity to an object, to meet specific absorption rate (SAR) criteria, and to affect resonance of the dual band T-shaped antenna.

