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(19) **United States**

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Karlsson

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(43) **Pub. Date: Nov. 9, 2017**

(54) **MULTI-BAND WLAN ANTENNA DEVICE**

(71) Applicant: **InCoax Networks Europe AB**, Gävle
(SE)

(72) Inventor: **Carl Karlsson**, Sandviken (SE)

(21) Appl. No.: **15/341,500**

(22) Filed: **Nov. 2, 2016**

(30) **Foreign Application Priority Data**

Apr. 18, 2016 (SE) 16300923

Publication Classification

(51) **Int. Cl.**
H01Q 1/22 (2006.01)
H01Q 1/38 (2006.01)
H01Q 1/36 (2006.01)

H01Q 1/48 (2006.01)

H01Q 5/50 (2006.01)

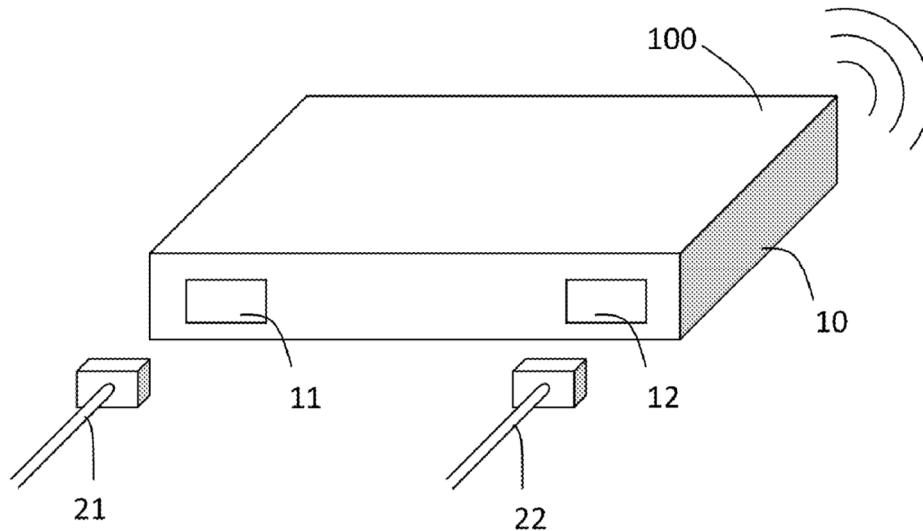
(52) **U.S. Cl.**

CPC **H01Q 1/2291** (2013.01); **H01Q 1/48**
(2013.01); **H01Q 5/50** (2015.01); **H01Q 1/36**
(2013.01); **H01Q 1/38** (2013.01)

(57)

ABSTRACT

A multi-band WLAN antenna device, comprising a layer of conductive material forming a planar ground plane, having a first side edge in which a first cutout is formed, having an indented cutout edge and first and second connecting edges. A first antenna structure is formed in the cutout, comprising a first member projecting from the first connecting edge and extending parallel to the indented cutout edge. The antenna structure also includes a second member having a first part projecting from a feed point at the indented cutout edge, extending through the first member, and a second part connected to the first part and extending parallel to the first member away from the first connecting edge.





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(19) **United States**

(12) **Patent Application Publication**
CHIANG

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(43) **Pub. Date: Nov. 9, 2017**

(54) **MOBILE COMMUNICATION DEVICE AND
REAR COVER THEREOF**

(71) Applicant: **AUDEN TECHNO CORP.**, Taoyuan
County (TW)

(72) Inventor: **CHI-MING CHIANG**, Taoyuan
County (TW)

(21) Appl. No.: **15/145,096**

(22) Filed: **May 3, 2016**

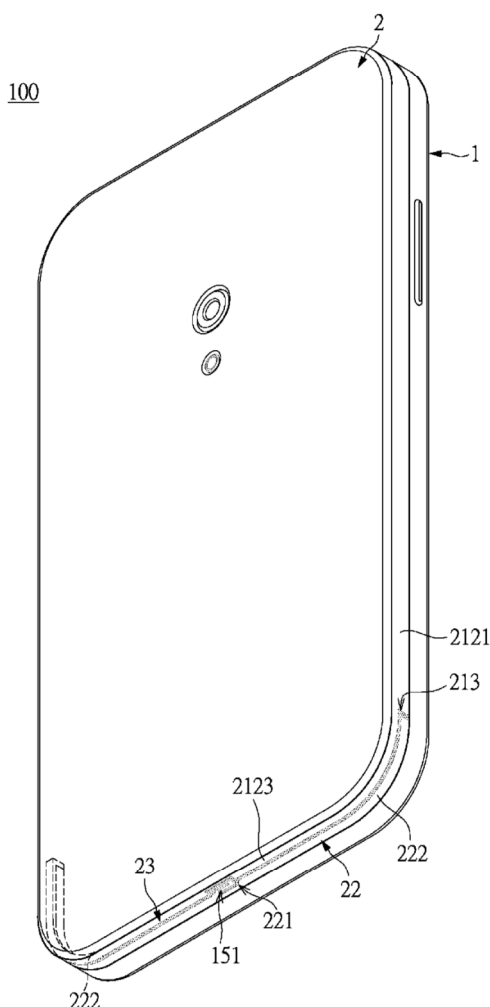
Publication Classification

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

(52) **U.S. Cl.**
CPC **H01Q 1/243** (2013.01)

(57) **ABSTRACT**

A rear cover of a mobile communication device includes a metal case, a communication antenna, and an insulating body connecting the metal case and the communication antenna. The metal case has a rear plate and a surrounding plate connected to the edge of the rear plate, and the surrounding plate has two side plates, a top plate, and a bottom plate. A notch is recessed on the edge of the bottom plate. The communication antenna is arranged in the notch, and part of the edge of the communication antenna faces toward the edge of the notch. A slot is recessed on the part of the edge of the communication antenna. The insulating body connects the part of the edge of the communication antenna and the edge of the notch, such that the communication antenna is electrically isolated from the metal case by the insulating body.





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

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(54) **ANTENNA APPARATUS AND METHOD
WITH DIELECTRIC FOR PROVIDING
CONTINUOUS INSULATION BETWEEN
ANTENNA PORTIONS**

(52) **U.S. CL.**
CPC **H01Q 1/243** (2013.01); **H01Q 1/521**
(2013.01)

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

(57) **ABSTRACT**

(72) Inventors: **Hongwei Liu**, South Elgin, IL (US);
Wee Kian Toh, San Diego, CA (US);
Qinjiang Rao, San Diego, CA (US)

(21) Appl. No.: **15/411,898**

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

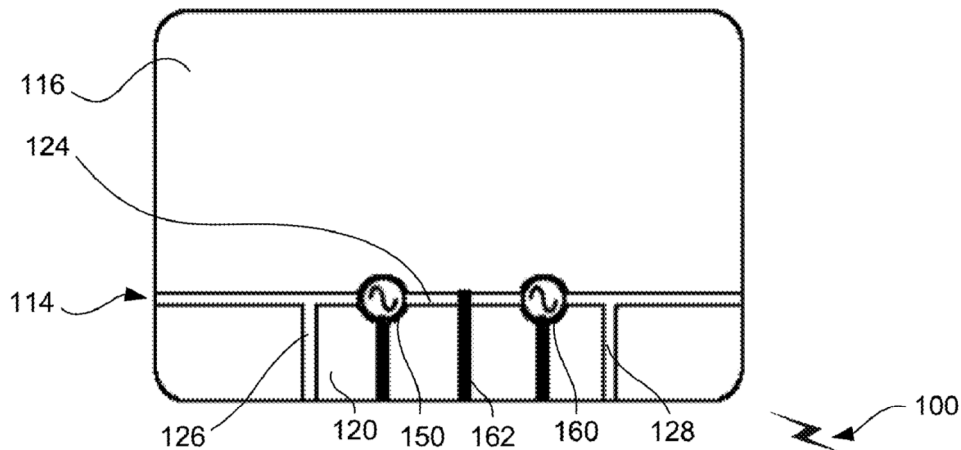
Related U.S. Application Data

(60) Provisional application No. 62/332,634, filed on May
6, 2016.

Publication Classification

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

An apparatus is provided including a first antenna with a top face; a bottom face; and a periphery defined by an upper portion, a lower portion, and a pair of side portions. The first slot comprises a body, a first arm, and a second arm that divides the first antenna into a first portion, a second portion, a third portion, and a fourth portion. The first portion is larger than the third portion, and the third portion is larger than the second portion and the fourth portion. Further, the body of the first slot extends between the side portions of the periphery. Still yet, the first arm and the second arm extend between the body and one of the upper portion and the lower portion of the periphery. A dielectric is positioned in the first slot for providing continuous insulation between the first portion, the second portion, the third portion, and the fourth portion.





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(19) **United States**

(12) **Patent Application Publication**
Mai

(10) **Pub. No.: US 2017/0324151 A1**

(43) **Pub. Date: Nov. 9, 2017**

(54) **LTE FULL-BAND CELLPHONE ANTENNA
STRUCTURE**

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

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

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

(21) Appl. No.: **15/416,913**

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

(30) **Foreign Application Priority Data**

May 3, 2016 (CN) 201610284245.0

Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 5/50 (2006.01)
H01Q 1/48 (2006.01)
H01Q 3/24 (2006.01)

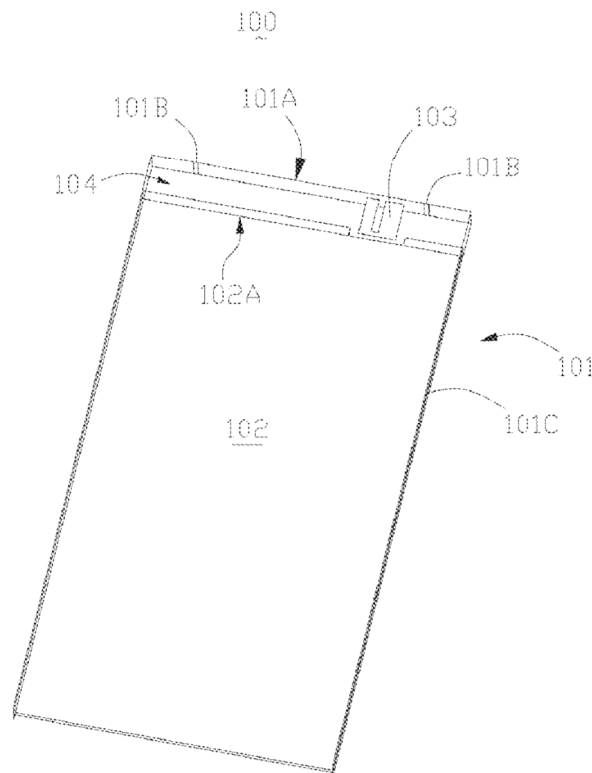
(52) **U.S. Cl.**

CPC **H01Q 1/243** (2013.01); **H01Q 3/24**
(2013.01); **H01Q 5/50** (2015.01); **H01Q 1/48**
(2013.01)

(57)

ABSTRACT

Provided is an LTE full-band cellphone antenna structure, including a ground plate, a circuit board having a feeding point, a feeding terminal matching circuit provided on the circuit board and a metal unit surrounding the circuit board and the ground plate. The metal unit includes a grounding portion electrically connected with the ground plate and a non-grounding portion electrically disconnected with the grounding portion. The feeding point is electrically connected with the non-grounding portion so that the non-grounding portion serves as a middle-high frequency radiator. A gap is provided between the non-grounding portion and the ground plate, and the ground plate is excited in a coupling manner so as to generate a current, such that the ground plate serves as a low frequency radiator. The antenna of the present disclosure covers all LTE frequency bands, which has advantages of less tuning difficulty and less influence by processing accuracy.

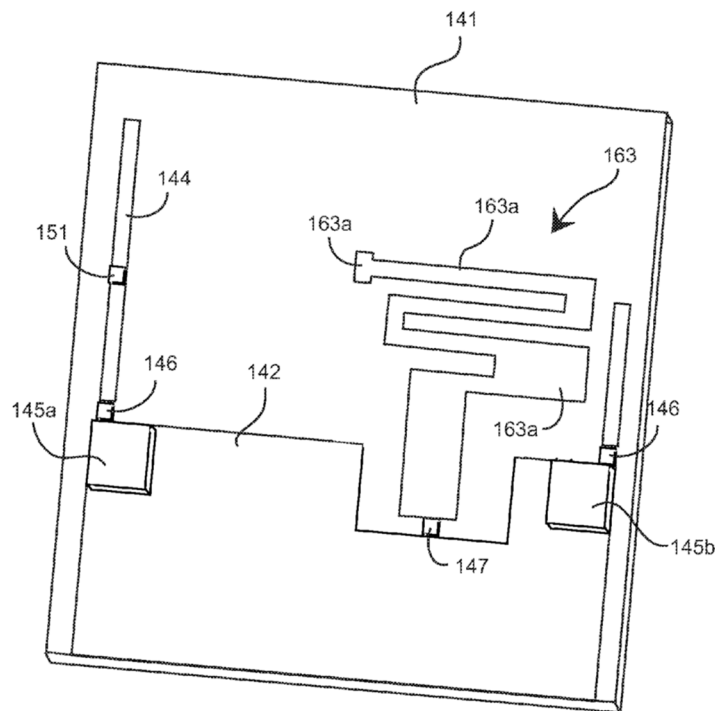




US 20170331174A1

(19) **United States**(12) **Patent Application Publication**
Rowson et al.(10) **Pub. No.: US 2017/0331174 A1**(43) **Pub. Date: Nov. 16, 2017**(54) **ANTENNA AND METHOD FOR STEERING
ANTENNA BEAM DIRECTION FOR WIFI
APPLICATIONS**(71) Applicant: **Ethertronics, Inc.**, San Diego, CA (US)(72) Inventors: **Sebastian Rowson**, San Diego, CA
(US); **Laurent Desclos**, San Diego, CA
(US); **Jeffrey Shamblin**, San Marcos,
CA (US)(73) Assignee: **Ethertronics, Inc.**, San Diego, CA (US)(21) Appl. No.: **15/660,907**(22) Filed: **Jul. 26, 2017****Related U.S. Application Data**(63) Continuation of application No. 14/965,881, filed on
Dec. 10, 2015, now Pat. No. 9,748,637, which is a
continuation-in-part of application No. 14/144,461,
filed on Dec. 30, 2013, now Pat. No. 9,240,634,
which is a continuation of application No. 13/726,
477, filed on Dec. 24, 2012, now Pat. No. 8,648,755,which is a continuation of application No. 13/029,
564, filed on Feb. 17, 2011, now Pat. No. 8,362,962,
which is a continuation of application No. 12/043,
090, filed on Mar. 5, 2008, now Pat. No. 7,911,402.**Publication Classification**(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 9/04 (2006.01)
H01Q 3/00 (2006.01)
(52) **U.S. Cl.**
CPC **H01Q 1/243** (2013.01); **H01Q 3/00**
(2013.01); **H01Q 9/0421** (2013.01)(57) **ABSTRACT**

An antenna comprising an IMD element and one or more parasitic and active tuning elements is disclosed. The IMD element, when used in combination with the active tuning and parasitic elements, allows antenna operation at multiple resonant frequencies. In addition, the direction of antenna radiation pattern may be arbitrarily rotated in accordance with the parasitic and active tuning elements. Unique antenna architectures for beam steering in Wi-Fi band applications is further described.





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(19) **United States**

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

(10) **Pub. No.: US 2017/0331187 A1**

(43) **Pub. Date: Nov. 16, 2017**

(54) **DUAL BAND PRINTED ANTENNA**

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

(72) Inventors: **Chun-Yen HUANG,** TAIPEI CITY
(TW); **I-Shu LEE,** TAIPEI CITY (TW);
Hung-Ming YU, TAIPEI CITY (TW)

(21) Appl. No.: **15/487,445**

(22) Filed: **Apr. 14, 2017**

(30) **Foreign Application Priority Data**

May 10, 2016 (TW) 105114435

Publication Classification

(51) **Int. Cl.**
H01Q 5/328 (2006.01)
H01Q 9/04 (2006.01)
H01Q 9/04 (2006.01)
H01Q 1/48 (2006.01)

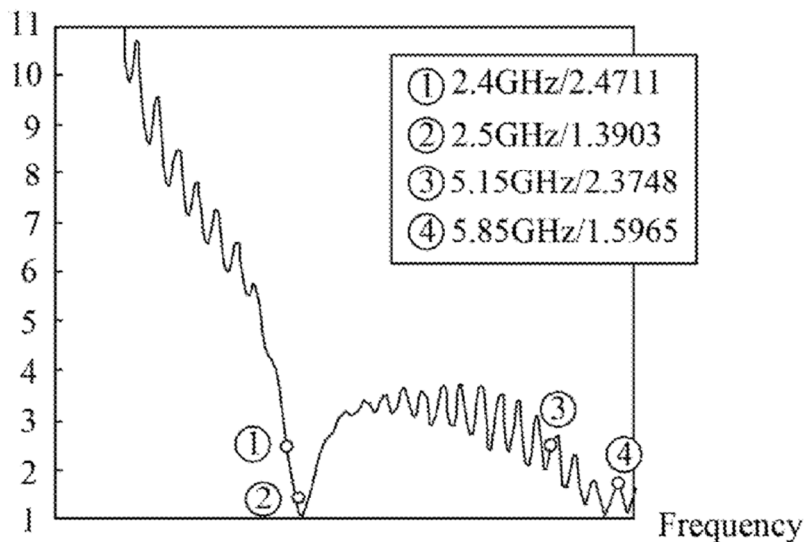
H01Q 1/38 (2006.01)
H01Q 13/10 (2006.01)
H01Q 5/335 (2006.01)

(52) **U.S. Cl.**
CPC **H01Q 5/328** (2015.01); **H01Q 13/106**
(2013.01); **H01Q 9/0442** (2013.01); **H01Q**
5/335 (2015.01); **H01Q 1/48** (2013.01); **H01Q**
1/38 (2013.01); **H01Q 9/0421** (2013.01)

(57) **ABSTRACT**

A dual band printed antenna that includes a metal substrate, an electrically isolated supporting element and a monopole antenna element. The metal substrate includes a slot. A side of the isolated supporting element is formed on the metal substrate. The monopole antenna element is formed on the other side of the isolated supporting element and corresponding to the position of the slot. The monopole antenna element includes a radiation part that includes a feed point and a ground part separated from the radiation part for a distance. The radiation part resonates with the slot to generate a radiation pattern of a first frequency band. The radiation part resonates itself to generate a radiation pattern of a second frequency band.

VSWR





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(19) **United States**

(12) **Patent Application Publication**
YIN

(10) **Pub. No.: US 2017/0331188 A1**

(43) **Pub. Date: Nov. 16, 2017**

(54) **ADJUSTABLE MULTI-BAND ANTENNA AND
ANTENNA DEBUGGING METHOD**

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

CPC *H01Q 5/335* (2015.01); *H01Q 5/50*
(2015.01); *H01Q 1/24* (2013.01)

(71) Applicant: **ZTE CORPORATION**, Shenzhen,
Guangdong (CN)

(72) Inventor: **Fei YIN**, Shenzhen, Guangdong (CN)

(57)

ABSTRACT

(21) Appl. No.: **15/532,416**

(22) PCT Filed: **Sep. 7, 2015**

(86) PCT No.: **PCT/CN2015/089069**

§ 371 (c)(1),

(2) Date: **Jun. 1, 2017**

(30) **Foreign Application Priority Data**

Dec. 2, 2014 (CN) 201410723218.X

Publication Classification

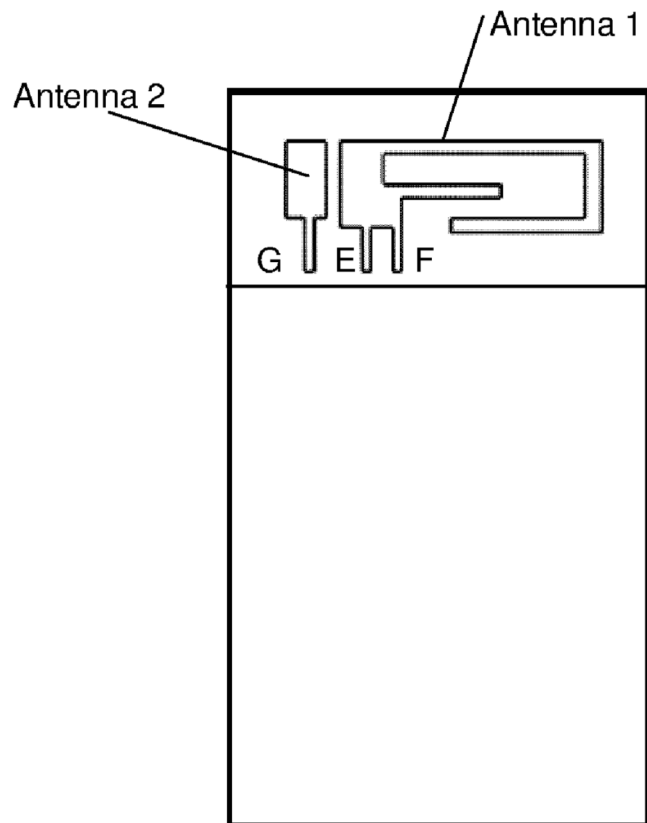
(51) **Int. Cl.**

H01Q 5/335 (2006.01)

H01Q 5/50 (2006.01)

H01Q 1/24 (2006.01)

Disclosed are an adjustable multi-band antenna and an antenna debugging method. In the adjustable multi-band antenna of some embodiments includes: a first antenna unit connected with a first antenna impedance unit; the first antenna impedance unit connected with a first control unit; and the first control unit connected to a radio frequency circuit; a second antenna unit connected with a second control unit; the second control unit connected with the first control unit through an antenna matching unit, and grounded through a second antenna impedance unit; the first control unit configured to control conduction of the first antenna unit and the radio frequency circuit and conduction of the second antenna unit and the radio frequency circuit; and the second control unit configured to control connection of the second antenna unit with the antenna matching unit and the second antenna impedance unit.





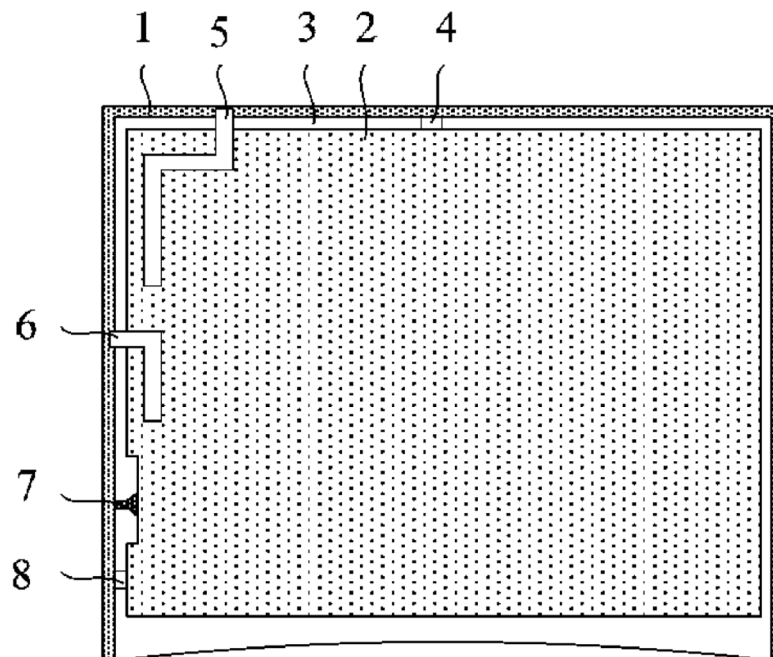
US 20170331189A1

(19) **United States**(12) **Patent Application Publication**
WANG et al.(10) **Pub. No.: US 2017/0331189 A1**(43) **Pub. Date: Nov. 16, 2017**(54) **WIRELESS MOBILE DEVICE**(71) Applicant: **Huawei Technologies Co., Ltd.**,
Shenzhen (CN)(72) Inventors: **Hanyang WANG**, Reading (GB);
Hongyu WANG, Shenzhen (CN);
Huiliang XU, Shenzhen (CN); **Shuwen**
LYU, Shanghai (CN); **Jianming LI**,
Shanghai (CN); **Lei WANG**, Shanghai
(CN); **Lina CHEN**, Shenzhen (CN)(21) Appl. No.: **15/523,227**(22) PCT Filed: **Oct. 31, 2014**(86) PCT No.: **PCT/CN2014/090091**

§ 371 (c)(1),

(2) Date: **Apr. 28, 2017****Publication Classification**(51) **Int. Cl.**
H01Q 5/371 (2006.01)
H01Q 9/04 (2006.01)
G01S 19/13 (2010.01)(52) **U.S. Cl.**CPC **H01Q 5/371** (2015.01); **H01Q 9/04**
(2013.01); **G01S 19/13** (2013.01)(57) **ABSTRACT**

The present embodiments disclose a wireless mobile device, including a metal frame, a circuit board disposed in the metal frame, where there is a slot between at least one side edge of the circuit board and the metal frame, a first grounding point is connected to the circuit board and the metal frame, a second grounding point is connected to the circuit board and the metal frame, and a feeding point is located between the first grounding point and the second grounding point and is connected to the circuit board and the metal frame; and each antenna open-circuit stub suspends in space on an outer side of the circuit board, one end is connected to the metal frame by crossing the slot, and a connection point of the antenna open-circuit stub and metal frame is located between the feeding point and the second grounding point.





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(19) **United States**

(12) **Patent Application Publication**
Yang

(10) **Pub. No.: US 2017/0331192 A1**

(43) **Pub. Date: Nov. 16, 2017**

(54) **STACKED PATCH ANTENNAS USING
DIELECTRIC SUBSTRATES WITH
PATTERNED CAVITIES**

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

CPC **H01Q 9/0414** (2013.01); **H01Q 1/38**
(2013.01)

(71) Applicant: **NovAtel, Inc.**, Calgary (CA)

(72) Inventor: **Ning Yang**, Calgary (CA)

(21) Appl. No.: **15/151,122**

(22) Filed: **May 10, 2016**

Publication Classification

(51) **Int. Cl.**

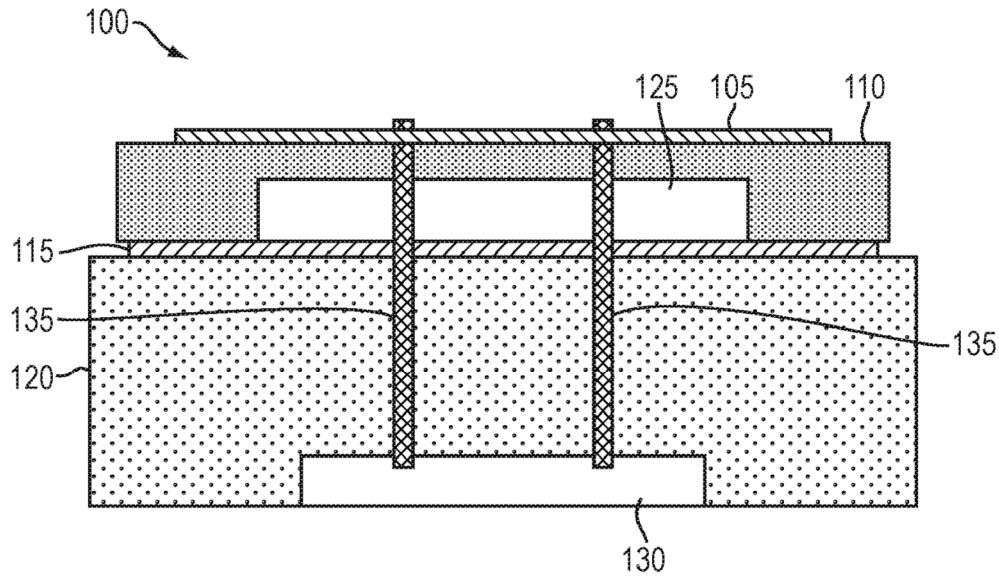
H01Q 9/04 (2006.01)

H01Q 1/38 (2006.01)

(57)

ABSTRACT

A GNSS RHCP stacked patch antenna with wide dual band, high efficiency and small size is made of a molded high-permittivity material, such as ceramics, with a patterned cavity in the dielectric substrate. The perforated cavities in the substrate reduce the effective dielectric constant, increase the bandwidth and efficiency. The high-order modes can be manipulated through the design of cavities.





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(19) **United States**

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

(10) **Pub. No.: US 2017/0331196 A1**

(43) **Pub. Date: Nov. 16, 2017**

(54) **ANTENNA FOR MOBILE PHONE AND
MOBILE PHONE HAVING THE SAME**

Publication Classification

(71) Applicant: **BYD COMPANY LIMITED,**
Shenzhen (CN)

(51) **Int. Cl.**

H01Q 13/10 (2006.01)

H04B 1/034 (2006.01)

H01Q 13/12 (2006.01)

(72) Inventors: **Yijin WANG,** Shenzhen (CN); **Lianhua LI,** Shenzhen (CN); **Wensong WANG,** Shenzhen (CN); **Munyong CHOI,** Shenzhen (CN); **Faping WANG,** Shenzhen (CN)

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

CPC **H01Q 13/106** (2013.01); **H01Q 13/12** (2013.01); **H04B 1/034** (2013.01)

(73) Assignee: **BYD COMPANY LIMITED,**
Shenzhen (CN)

(57)

ABSTRACT

(21) Appl. No.: **15/531,629**

(22) PCT Filed: **Nov. 20, 2015**

(86) PCT No.: **PCT/CN2015/095206**

§ 371 (c)(1),

(2) Date: **May 30, 2017**

(30) **Foreign Application Priority Data**

Nov. 28, 2014 (CN) 201410709050.7

An antenna for a mobile phone and a mobile phone having the same are provided. The antenna for a mobile phone includes: a metal mobile phone case provided with a first slot and a second slot intersecting with the first slot; a circuit board having a clearance zone and a parasitic branch stretching into the clearance zone, and disposed within the metal mobile phone case; an exciting sheet disposed between the circuit board and the metal mobile phone case, and across the first slot in a width direction of the first slot; a dielectric filler disposed between the exciting sheet and the metal mobile phone case, and configured to fill the first slot and the second slot.

