



US 20150054691A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0054691 A1**

(43) **Pub. Date: Feb. 26, 2015**

(54) **INFORMATION PROCESSING APPARATUS**

(71) Applicant: **PANASONIC CORPORATION**, Osaka (JP)

(72) Inventors: **Kouji WATANABE**, Osaka (JP);
Yasuharu MATSUOKA, Osaka (JP)

(21) Appl. No.: **14/445,811**

(22) Filed: **Jul. 29, 2014**

(30) **Foreign Application Priority Data**

Aug. 23, 2013 (JP) 2013-173181
Jul. 2, 2014 (JP) 2014-136522

Publication Classification

(51) **Int. Cl.**
H01Q 1/22 (2006.01)
H01Q 21/30 (2006.01)

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

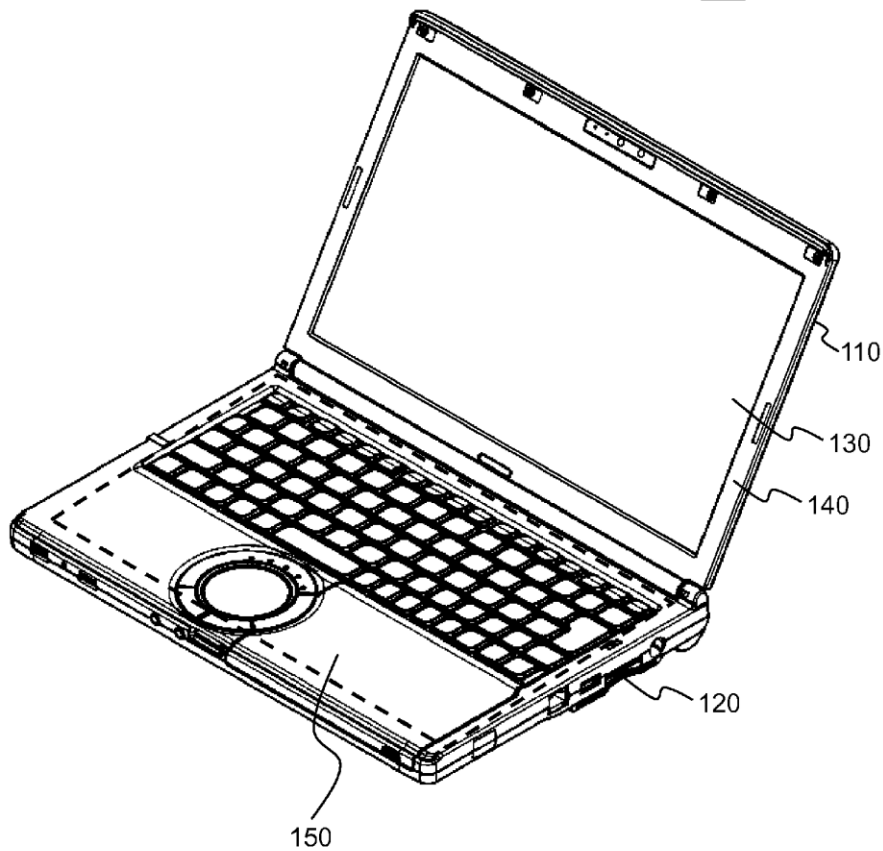
CPC **H01Q 1/2266** (2013.01); **H01Q 21/30** (2013.01)

USPC **343/702; 343/720**

(57) **ABSTRACT**

There is provided an information processing apparatus in which an antenna operating in two or more communication bands is disposed in a space conserving manner. An information processing apparatus according to the present disclosure has: a network interface for processing signals used for communications in a plurality of frequency bands; a display panel having a main surface for displaying an image, a rear surface opposite to the main surface, and a side surface defining a thickness between the main surface and the rear surface; an antenna connected to the network interface and having a conductive antenna element; and a conductive rib conducted to the antenna element, and holding the antenna with a predetermined gap between the antenna and the side surface of the display panel. The network interface processes the signals by resonance of a part of the antenna element and a part of the rib.

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(19) **United States**

(12) **Patent Application Publication**
LIN

(10) **Pub. No.: US 2015/0054693 A1**

(43) **Pub. Date: Feb. 26, 2015**

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

(52) **U.S. Cl.**
CPC **H01Q 5/0062** (2020.01); **H01Q 1/24** (2020.01)
USPC **343/702**; 343/700 MS

(71) Applicant: **CHIUN MAI COMMUNICATION SYSTEMS, INC.**, New Taipei (TW)

(57) **ABSTRACT**

(72) Inventor: **YEN-HUI LIN**, Tu-Cheng (TW)

A wireless communication device includes a substrate and an antenna structure. The substrate includes a first surface and a second surface opposite the first surface. The antenna structure includes a feeding antenna, a metal ring, and a parasitic antenna. The feeding antenna has a feeding point configured to feed current signal. The metal ring is positioned apart from the feeding antenna, the metal ring is configured to be grounded and resonate with the feeding antenna to generate a first high-frequency resonate mode. The parasitic antenna is connected to the metal ring, the parasitic antenna is configured to resonate with the feeding antenna to generate a second high-frequency resonate mode, and resonate with the metal ring to generate a low-frequency mode.

(21) Appl. No.: **14/463,900**

(22) Filed: **Aug. 20, 2014**

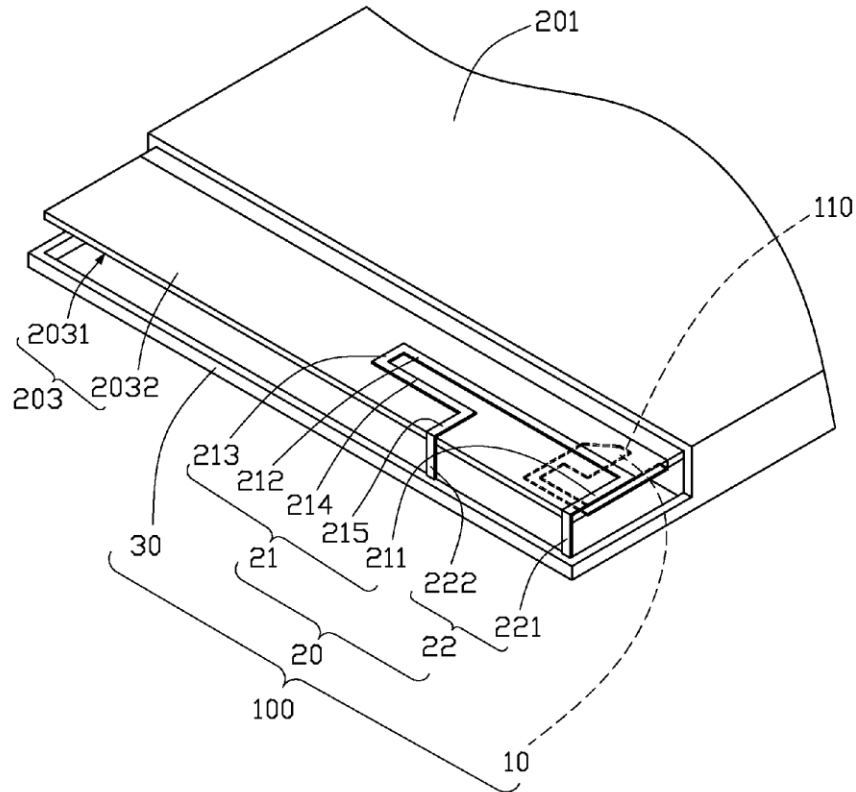
(30) **Foreign Application Priority Data**

Aug. 22, 2013 (CN) 2013103671658

Publication Classification

(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 1/24 (2006.01)

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(19) **United States**

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

(10) **Pub. No.: US 2015/0054697 A1**

(43) **Pub. Date: Feb. 26, 2015**

(54) **TUNABLE ANTENNA STRUCTURE AND WIRELESS COMMUNICATION DEVICE EMPLOYING SAME**

(52) **U.S. Cl.**
CPC . *H01Q 1/50* (2013.01); *H03H 7/38* (2013.01); *H01F 38/14* (2013.01)

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

USPC **343/745**

(72) Inventors: **JIN-BO CHEN,** New Taipei (TW);
CHO-KANG HSU, New Taipei (TW)

(57) **ABSTRACT**

(21) Appl. No.: **14/463,888**

A tunable antenna structure includes an antenna, a first switch circuit and a second switch circuit. The antenna structure includes a feeding point configured to feed current signal and a grounding point configured to be grounded. The first switch circuit includes a first plurality of loads and a first switch electronically coupled to the feeding point and the first plurality of loads. The first switch is configured to selectively couple one of the first plurality of loads to the feeding point. The second switch circuit includes a second plurality of loads and a second switch electronically coupled to the grounding point and the second plurality of loads. The second switch is configured to selectively couple one of the second plurality of loads to the grounding point.

(22) Filed: **Aug. 20, 2014**

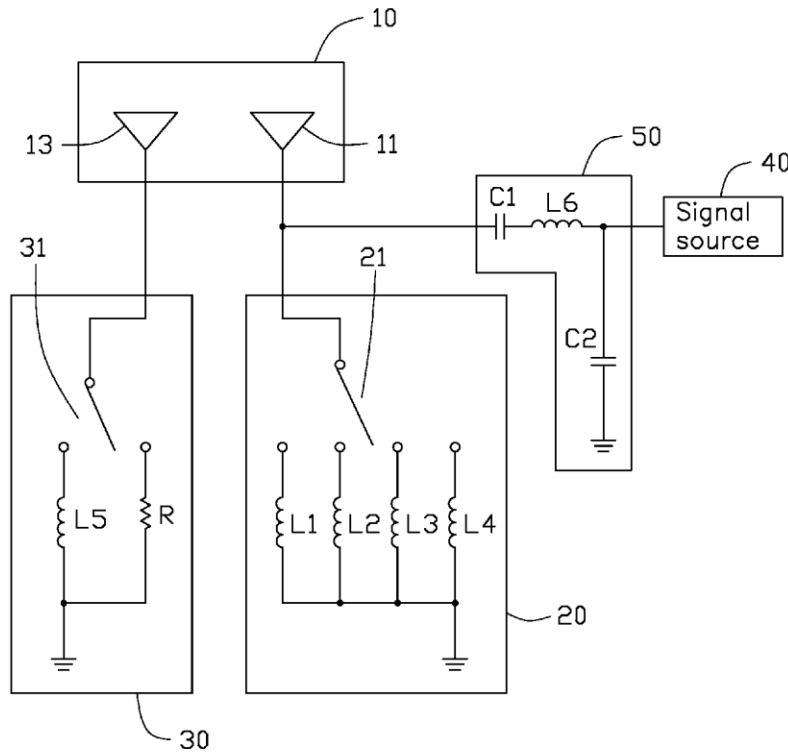
(30) **Foreign Application Priority Data**

Aug. 22, 2013 (CN) 2013103672311

Publication Classification

(51) **Int. Cl.**
H01Q 1/50 (2006.01)
H01F 38/14 (2006.01)
H03H 7/38 (2006.01)

100





US 20150054698A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0054698 A1**

(43) **Pub. Date: Feb. 26, 2015**

(54) **ANTENNA TUNING CIRCUITRY WITH REDUCED INTERFERENCE**

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

CPC *H01Q 5/0037* (2013.01)

USPC **343/745**

(71) Applicant: **RF Micro Devices, Inc.**, Greensboro, NC (US)

(72) Inventors: **Daniel Charles Kerr**, Oak Ridge, NC (US); **Christian Rye Iversen**, Vestbjerg (DK); **Eric K. Bolton**, Kernersville, NC (US); **Ruediger Bauder**, Feldkirchen-Westerham (DE); **Nadim Khlata**, Cugnaux (FR)

(57)

ABSTRACT

Antenna tuning circuitry includes an antenna tuning node, an antenna tuning switch, and a resonant tuning circuit. The antenna tuning node is coupled to a resonant conduction element of an antenna. The antenna tuning switch and the resonant tuning circuit are coupled in series between the antenna tuning node and the antenna tuning switch. The resonant tuning circuit is configured to resonate at one or more harmonic frequencies generated by the antenna tuning switch such that a high impedance path is formed between the antenna tuning node and the antenna tuning switch at harmonic frequencies generated by the antenna tuning switch. Accordingly, harmonic interference generated by the antenna tuning switch is prevented from reaching the antenna, while simultaneously allowing for tuning of the antenna.

(21) Appl. No.: **14/465,142**

(22) Filed: **Aug. 21, 2014**

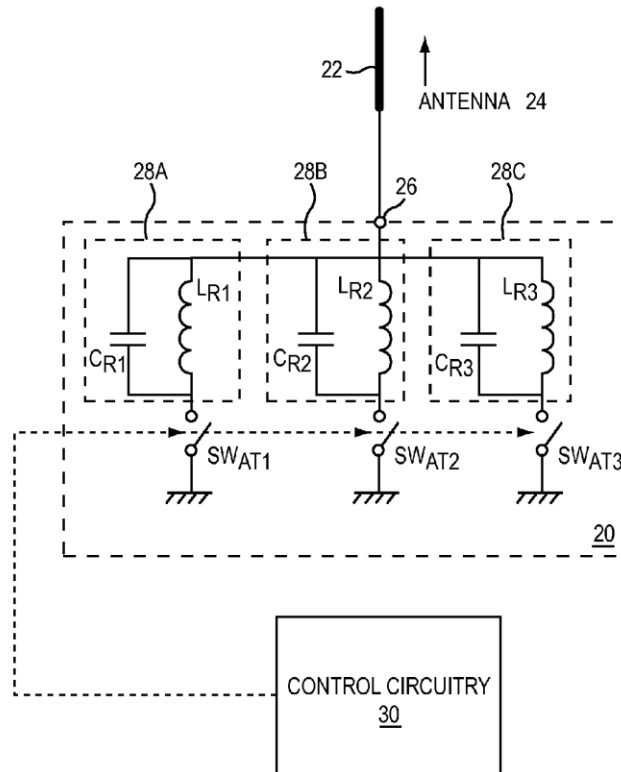
Related U.S. Application Data

(60) Provisional application No. 61/868,154, filed on Aug. 21, 2013.

Publication Classification

(51) **Int. Cl.**
H01Q 5/00

(2006.01)





US 20150054699A1

(19) **United States**

(12) **Patent Application Publication**

ALI et al.

(10) **Pub. No.: US 2015/0054699 A1**

(43) **Pub. Date: Feb. 26, 2015**

(54) **TUNABLE MULTIBAND MULTIPORT ANTENNAS AND METHOD**

Publication Classification

(71) Applicant: **BlackBerry Limited**, Waterloo (CA)

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

(72) Inventors: **Shirook M. ALI**, Milton (CA); **Mark E. PECEN**, Waterloo (CA); **James Paul Warden**, Fort Worth, TX (US)

(52) **U.S. Cl.**
CPC *H01Q 1/36* (2013.01); *H01Q 5/0027* (2013.01)
USPC **343/749; 29/600**

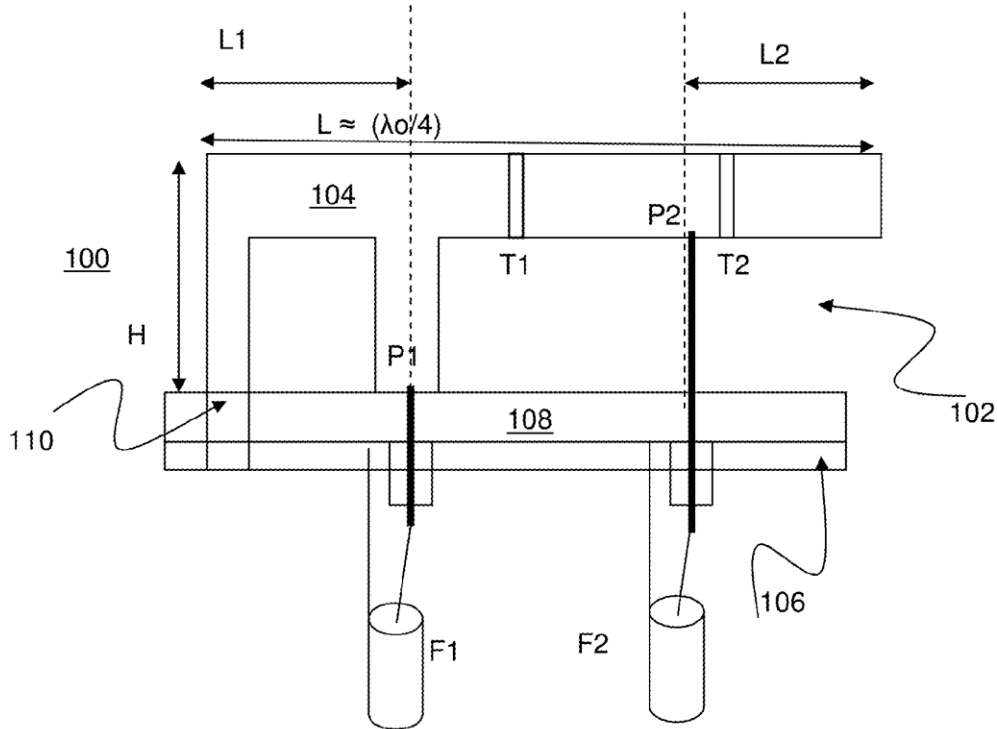
(73) Assignee: **BlackBerry Limited**, Waterloo (CA)

(57) **ABSTRACT**

An antenna, comprising a plurality of feed points and tuning elements for tuning a resonant frequency at each feed point independently of the others of the plurality of feed points. The tuning elements are placed on the configured radiating element such that for a given feed point its tuning element is placed on the configured radiating element where a current distribution of the other feed points is a minimum.

(21) Appl. No.: **13/973,876**

(22) Filed: **Aug. 22, 2013**





US 20150054708A1

(19) **United States**

(12) **Patent Application Publication**
LIN

(10) **Pub. No.: US 2015/0054708 A1**

(43) **Pub. Date: Feb. 26, 2015**

(54) **BROADBAND ANTENNA AND WIRELESS COMMUNICATION DEVICE EMPLOYING SAME**

(52) **U.S. Cl.**
CPC *H01Q 5/0093* (2013.01); *H01Q 9/045* (2013.01); *H01Q 1/48* (2013.01); *H01Q 1/50* (2013.01)

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

USPC **343/846**

(72) Inventor: **YEN-HUI LIN**, Tu-Cheng (TW)

(57) **ABSTRACT**

(21) Appl. No.: **14/464,163**

(22) Filed: **Aug. 20, 2014**

(30) **Foreign Application Priority Data**

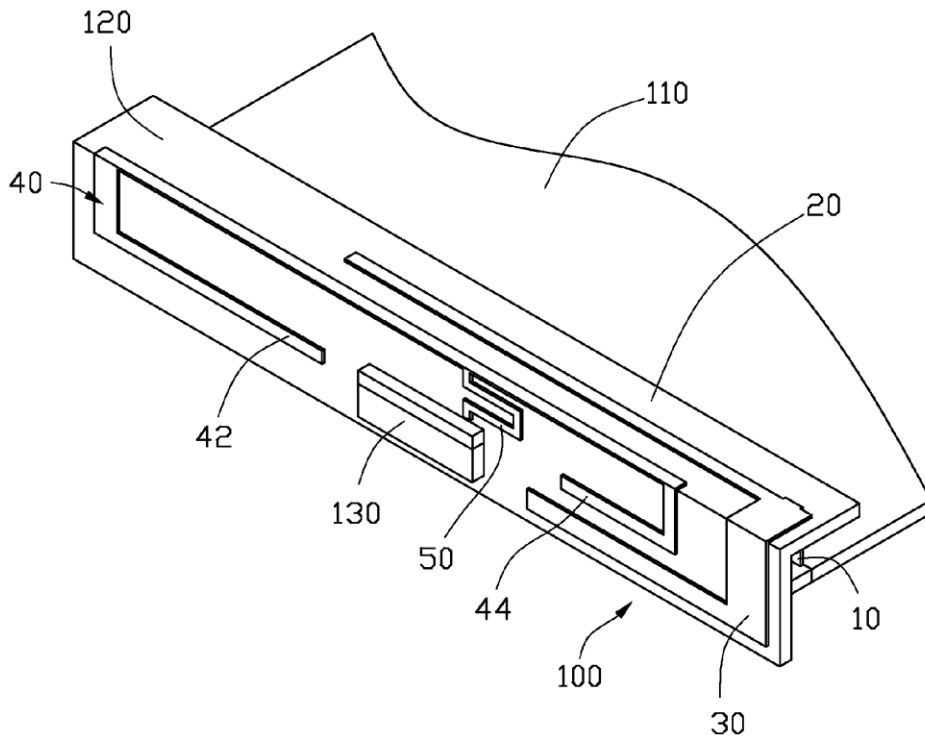
Aug. 22, 2013 (CN) 2013103696161

Publication Classification

(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 1/48 (2006.01)
H01Q 1/50 (2006.01)
H01Q 9/04 (2006.01)

A broadband antenna is mounted aside a metal electronic element and includes a feeding portion, a first connecting portion, a second connecting portion, a coupling portion, and a ground portion. The first radiating portion and the second radiating portion are both connected perpendicular to the feeding portion. The coupling portion is spaced from the first radiating portion and the second connecting portion. The ground portion is connected perpendicular to a middle portion of the coupling portion and adjacent to the metal electronic element. These portions cooperatively use a low frequency mode and a high frequency mode. The ground portion increases an inductance performance of the broadband antenna, thereby decreasing interference caused by the metal electronic elements. A wireless communication device employing the broadband antenna is also disclosed.

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(19) **United States**

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

(10) **Pub. No.: US 2015/0054711 A1**

(43) **Pub. Date: Feb. 26, 2015**

(54) **SYSTEM AND METHOD FOR A MOBILE ANTENNA WITH ADJUSTABLE RESONANT FREQUENCIES AND RADIATION PATTERN**

(52) **U.S. Cl.**
CPC . *H01Q 21/30* (2013.01); *H01Q 3/24* (2013.01)
USPC **343/876**

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

(57) **ABSTRACT**

(72) Inventors: **Chun Kit Lai**, La Jolla, CA (US); **Wee Kian Toh**, San Diego, CA (US); **Ning Ma**, San Diego, CA (US)

(73) Assignee: **FutureWei Technologies, Inc.**, Plano, TX (US)

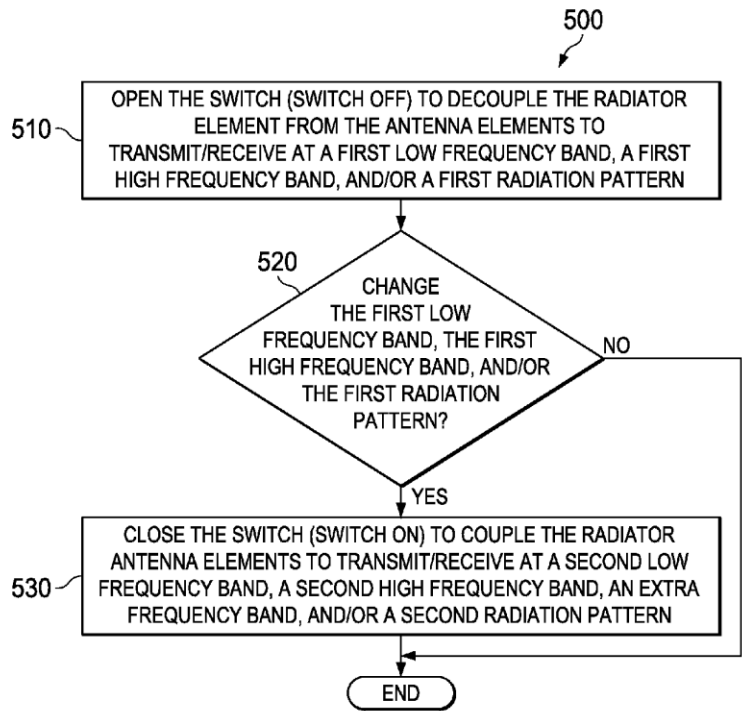
Embodiments are provided for an efficient antenna design and operation method to adjust or add frequency bands at mobile devices using the available limited antenna size. The embodiments include electrically coupling to the antenna elements at a mobile or radio device a tuning stub or element through a printed circuit board (PCB) or a metal chassis. The PCB is placed between the antenna elements and the tuning stub and is connected to the antenna elements. The tuning stub, e.g., at a corner of the PCB, is connected or disconnected via a switch from the PCB, and hence the antenna elements, to shift the radiation of the antenna at different frequencies and also provide an additional mode of radiation. The tuning stub can also be switched to vary the radiation pattern of the antenna.

(21) Appl. No.: **13/971,628**

(22) Filed: **Aug. 20, 2013**

Publication Classification

(51) **Int. Cl.**
H01Q 21/30 (2006.01)
H01Q 3/24 (2006.01)





US 20150057054A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0057054 A1**

(43) **Pub. Date: Feb. 26, 2015**

(54) **TUNABLE ANTENNA AND WIRELESS COMMUNICATION DEVICE EMPLOYING SAME**

(52) **U.S. Cl.**
CPC *H04M 1/026* (2013.01)
USPC *455/575.7*

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

(57) **ABSTRACT**

(72) Inventors: **WEI-CHENG SU,** New Taipei (TW);
YEN-HUI LIN, Tu-Cheng (TW)

(21) Appl. No.: **14/463,880**

(22) Filed: **Aug. 20, 2014**

(30) **Foreign Application Priority Data**

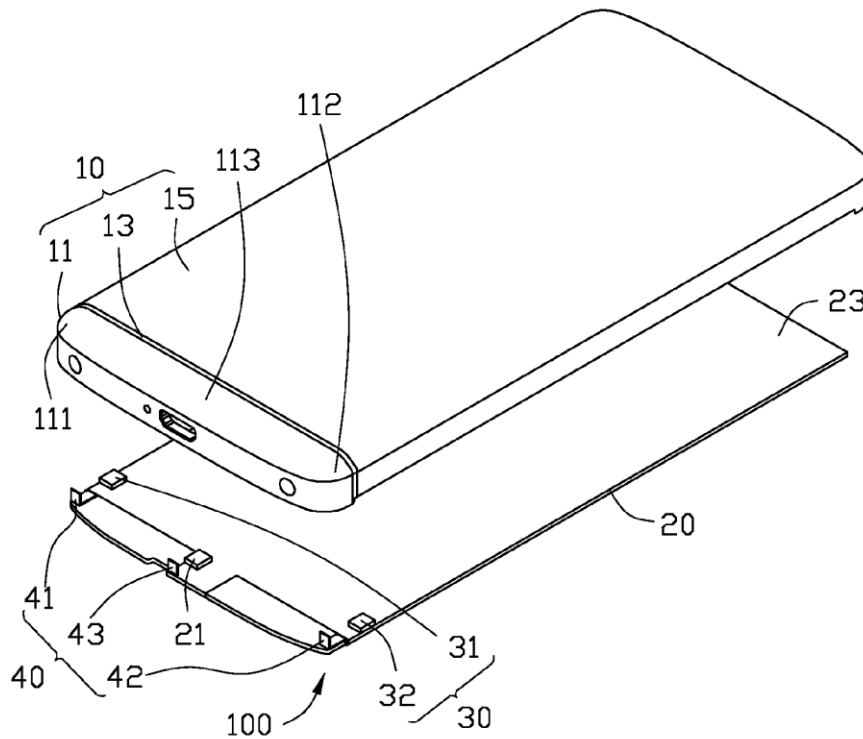
Aug. 22, 2013 (CN) 2013205127565

Publication Classification

(51) **Int. Cl.**
H04M 1/02 (2006.01)

A wireless communication device includes a substrate and a tunable antenna. The substrate has a signal source. The tunable antenna includes a metal cover and at least one matching circuit. The metal cover serves as a cover of the wireless communication device, and includes a radiation body, a main body, and a dielectric member coupled between the radiation body and the main body. The radiation body is coupled to the signal source and dielectric relative to the main body. The at least one matching circuit is configured to switch between multiple working mode to enable the radiation body to receive and send wireless signals at different frequency bands.

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(19) **United States**

(12) **Patent Application Publication**
Chou

(10) **Pub. No.: US 2015/0061939 A1**

(43) **Pub. Date: Mar. 5, 2015**

(54) **MULTI-BAND ANTENNA AND PORTABLE ELECTRONIC DEVICE THEREOF**

(52) **U.S. Cl.**
CPC **H01Q 5/0027** (2013.01)
USPC **343/700 MS**

(71) Applicant: **Wistron Corporation**, New Taipei City (TW)

(57) **ABSTRACT**

(72) Inventor: **Chen-Yu Chou**, New Taipei City (TW)

A multi-band antenna is disposed on a circuit board having a feeding line. The feeding line has a signal-transmitting end and a ground end. The multi-band antenna includes a feeding portion coupled to the signal-transmitting end, a ground portion coupled to the ground end, an intermediate-frequency sheet section extending from the feeding portion toward a first direction, a low-frequency arm, and a high-frequency arm. The low-frequency arm extends from a side of the intermediate-frequency sheet section toward a second direction opposite to the first direction. The high-frequency arm includes first and second bending portions. The first bending portion extends from the side of the intermediate-frequency sheet section toward the second direction so as to connect to the ground portion. The first bending portion has a recess. The second bending portion extends into the recess for transceiving signals within a first frequency band cooperatively with the first bending portion.

(73) Assignee: **Wistron Corporation**, New Taipei City (TW)

(21) Appl. No.: **14/061,768**

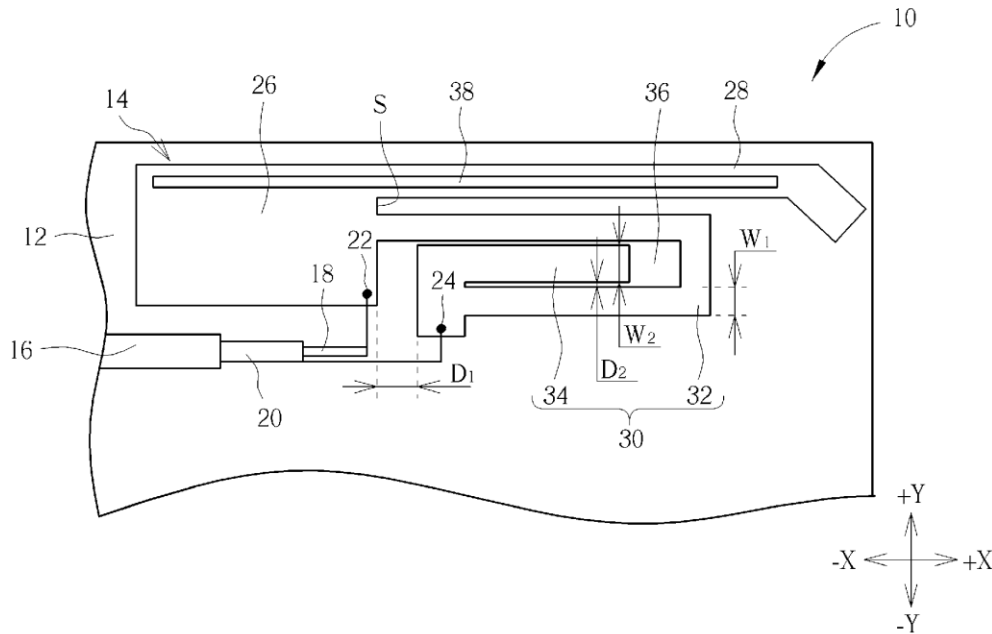
(22) Filed: **Oct. 24, 2013**

(30) **Foreign Application Priority Data**

Sep. 3, 2013 (TW) 102216565

Publication Classification

(51) **Int. Cl.**
H01Q 5/00 (2006.01)





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(19) **United States**

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

(10) **Pub. No.: US 2015/0061940 A1**

(43) **Pub. Date: Mar. 5, 2015**

(54) **ANTENNA MODULE AND ANTENNA THEREOF**

Publication Classification

(71) Applicants: **Universal Global Scientific Industrial Co., Ltd.**, Caotun Township (TW); **Universal Scientific Industrial (Shanghai) Co.,Ltd.**, Shanghai City (CN)

(51) **Int. Cl.**
H01Q 1/36 (2006.01)
(52) **U.S. Cl.**
CPC **H01Q 1/36** (2013.01)
USPC **343/700 MS**

(72) Inventors: **Hsin-Hong CHEN**, Taichung City (TW); **Jui-Kun SHIH**, Caotun Township (TW); **Chung-Hsin CHIANG**, Nantou City (TW)

(57) **ABSTRACT**

The present invention provides an antenna module and an antenna thereof. The antenna includes a first radiation element, a second radiation element, a third radiation element, and a short-circuit portion. The second radiation element has one end connected with the first radiation element. The third radiation element connected with the other end of the second radiation element, and includes a first connection section, a second connection section, and a third connection section. The first connection section is perpendicular to the second radiation element. The second connection section connected with the first connection section. The third connection section is connected with the second connection section and located at an internal side of the second connection section. The short-circuit portion connected with the second connection section and located at an external side of the second connection portion.

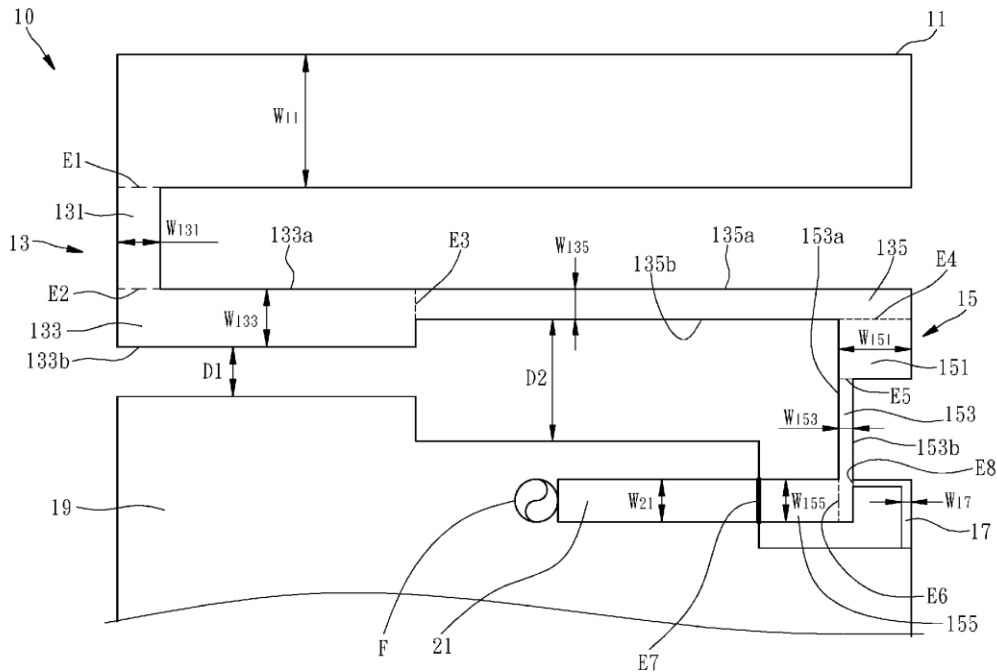
(73) Assignees: **Universal Global Scientific Industrial Co., Ltd.**, Caotun Township (TW); **Universal Scientific Industrial (Shanghai) Co.,Ltd.**, Shanghai City (CN)

(21) Appl. No.: **14/064,795**

(22) Filed: **Oct. 28, 2013**

(30) **Foreign Application Priority Data**

Aug. 30, 2013 (TW) 102131364





US 20150061943A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0061943 A1**

(43) **Pub. Date: Mar. 5, 2015**

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

H01Q 9/04 (2006.01)
H01Q 1/50 (2006.01)

(52) **U.S. Cl.**
CPC *H01Q 5/0058* (2013.01); *H01Q 1/50* (2013.01); *H01Q 1/48* (2013.01); *H01Q 9/0407* (2013.01)
USPC **343/700 MS**

(71) Applicant: **FIH (Hong Kong) Limited**, Kowloon (HK)

(72) Inventors: **CHUAN-CHOU CHI**, New Taipei (TW); **HAO-YING CHANG**, New Taipei (TW)

(21) Appl. No.: **14/469,881**

(22) Filed: **Aug. 27, 2014**

(30) **Foreign Application Priority Data**

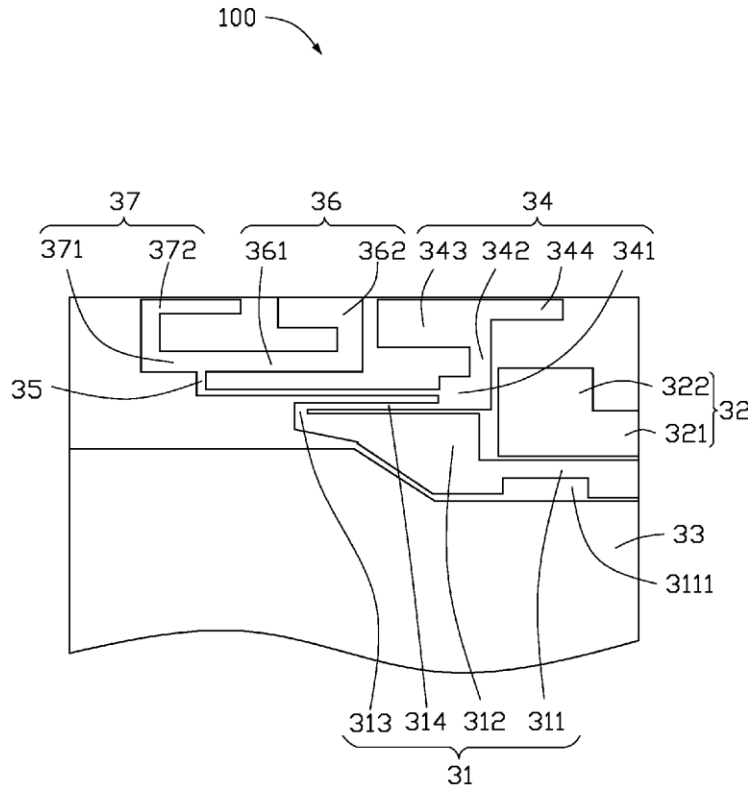
Aug. 29, 2013 (TW) 102131141

Publication Classification

(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 1/48 (2006.01)

(57) **ABSTRACT**

An antenna structure includes a feeding portion, a first grounding portion, a second grounding portion, a first radiating portion, a second radiating portion, a third radiating portion, and a fourth radiating portion. The feeding portion is configured to feed current signals. The first and second grounding portions are positioned at two opposite sides of the feeding portion respectively. The first, second and third radiating portions cooperatively form a first current path to excite a low-frequency resonate mode and a first high-frequency resonate mode; the first radiating portion resonates with the first grounding portion to excite a second high-frequency resonate mode; the second, third and fourth radiating portion cooperatively form a second current path to excite a third high-frequency resonate mode.





US 20150061948A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0061948 A1**

(43) **Pub. Date: Mar. 5, 2015**

(54) **ELECTRONIC DEVICE**

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

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

CPC **H01Q 1/243** (2013.01); **H01Q 5/0027**
(2013.01)
USPC **343/720**; 343/700 MS

(72) Inventors: **Chien-Ming HSU**, TAIPEI (TW);
Wei-Hsin SHIH, TAIPEI (TW)

(57) **ABSTRACT**

(21) Appl. No.: **14/469,605**

(22) Filed: **Aug. 27, 2014**

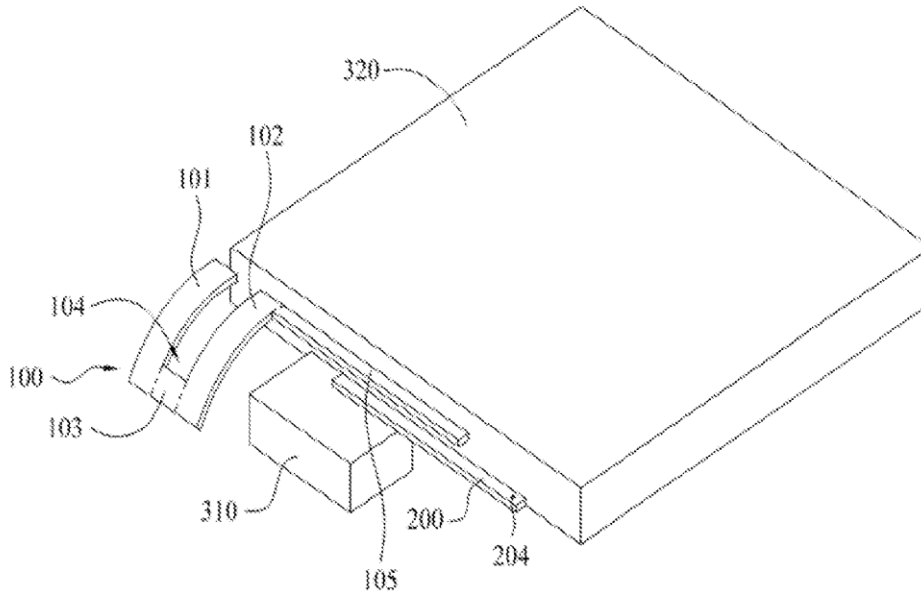
(30) **Foreign Application Priority Data**

Aug. 30, 2013 (TW) 102131342

Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 5/00 (2006.01)

An electronic device includes a first conducting element, a second conducting element and a multiband antenna. The multiband antenna includes a first radiating part and a first coupling metal part. At least a part of the first radiating part is disposed between the first conducting element and the second conducting element. The first coupling metal part parallels to the first radiating part and is connected to a ground. The electronic device can reduce the affection of metal components in a portable device on the antenna, and enables the antenna to operate at more and wider frequency bands.





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(19) **United States**

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

(10) **Pub. No.: US 2015/0061949 A1**
(43) **Pub. Date: Mar. 5, 2015**

(54) **BROADBAND ANTENNA WITH ADJUSTABLE
RESONANT FREQUENCY BAND**

Publication Classification

(71) Applicant: **QUANTA COMPUTER INC.**, Tao Yuan Hsien (TW)

(51) **Int. Cl.**
H01Q 5/00 (2006.01)

(72) Inventors: **Chi-Hsuan Lee**, Tao Yuan Hsien (TW);
Pei-Ling Teng, Tao Yuan Hsien (TW);
Kuo-Cheng Chen, Tao Yuan Hsien (TW)

(52) **U.S. Cl.**
CPC **H01Q 5/0034** (2013.01)
USPC **343/722**

(73) Assignee: **QUANTA COMPUTER INC.**, Tao Yuan Hsien (TW)

(57) **ABSTRACT**

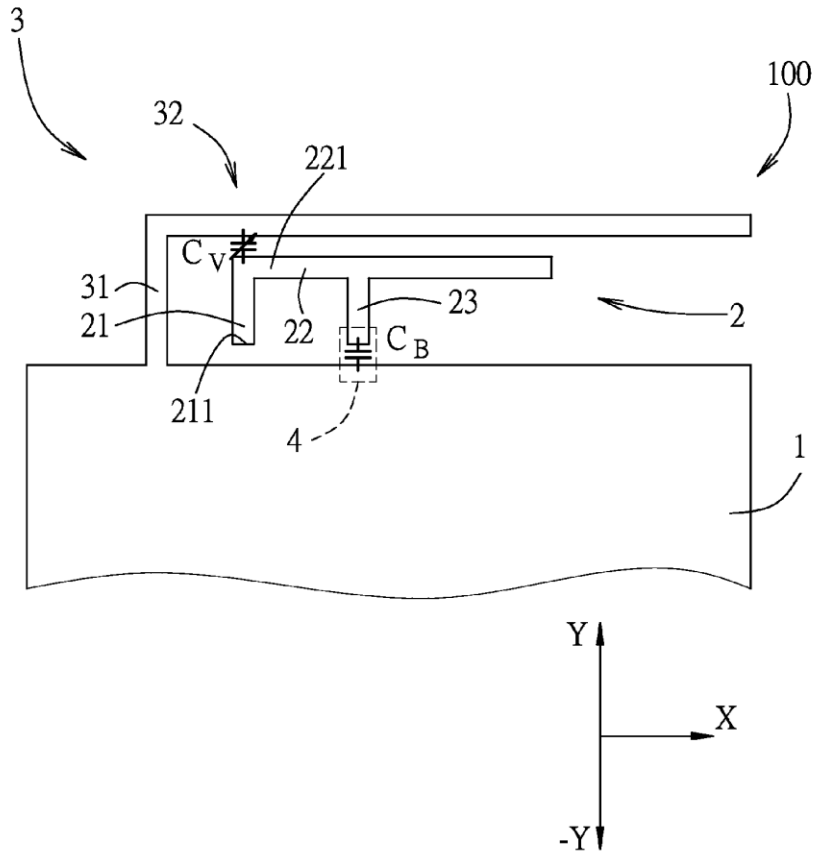
A broadband antenna with adjustable resonant frequency band includes a grounding element, first and second radiating conductors, and a variable capacitor. The first radiating conductor includes a feed-in portion and a radiating portion. The feed-in portion includes a feed-in end spaced apart from and adjacent to the grounding element. The second radiating conductor includes a coupling portion, and a short-circuit portion connected electrically between the coupling portion and the grounding element. The coupling portion is parallel to and couples with the radiating portion. The variable capacitor is connected electrically between the radiating portion and the coupling portion.

(21) Appl. No.: **14/289,962**

(22) Filed: **May 29, 2014**

(30) **Foreign Application Priority Data**

Sep. 5, 2013 (TW) 102132002





US 20150061950A1

(19) **United States**

(12) **Patent Application Publication**
Flores-Cuadras et al.

(10) **Pub. No.: US 2015/0061950 A1**
(43) **Pub. Date: Mar. 5, 2015**

(54) **SMALL DIGITAL TUNABLE ANTENNA SYSTEMS FOR WIRELESS APPLICATIONS**

(60) Provisional application No. 61/826,493, filed on May 23, 2013.

(71) Applicants: **Javier Ruben Flores-Cuadras**, Tijuana (MX); **Carlos Francisco Montoya-Mejia**, Tijuana (MX)

Publication Classification

(51) **Int. Cl.**
H01Q 1/50 (2006.01)
(52) **U.S. Cl.**
CPC **H01Q 1/50** (2013.01)
USPC **343/745**

(72) Inventors: **Javier Ruben Flores-Cuadras**, Tijuana (MX); **Carlos Francisco Montoya-Mejia**, Tijuana (MX)

(73) Assignee: **TAOGLAS GROUP HOLDINGS LIMITED**, San Diego, CA (US)

(57) **ABSTRACT**

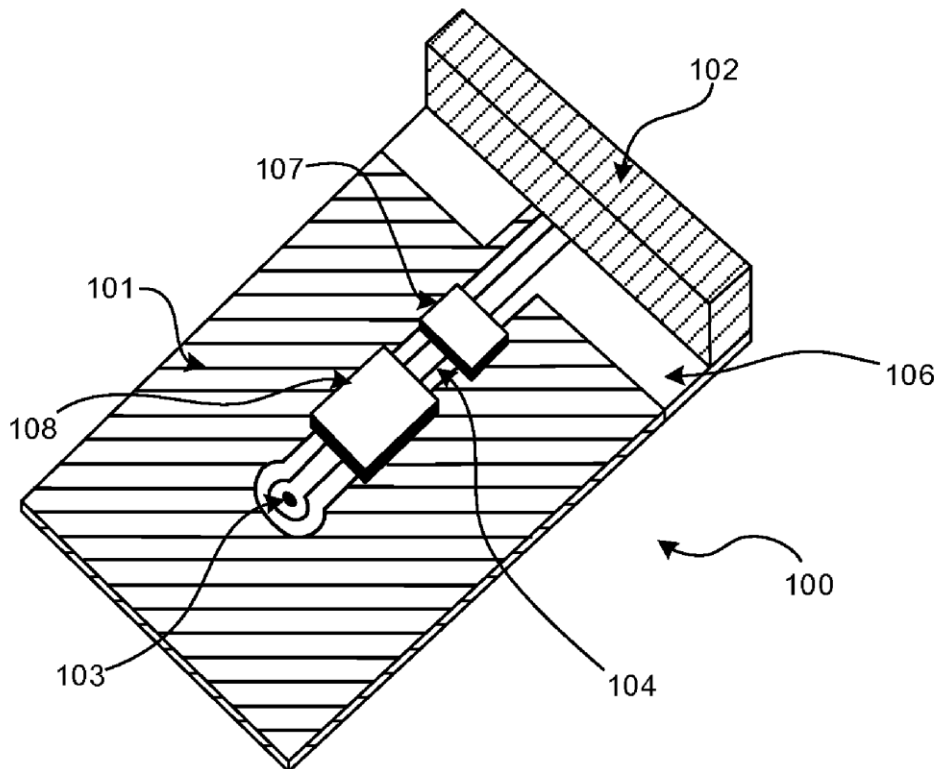
(21) Appl. No.: **14/534,021**

The instant disclosure provides an antenna system with a generically small ground plane and a generic antenna radiating module, wherein the system further includes a matching circuit and a tunable capacitor each bring integrated with the ground plane and antenna in a novel configuration which provides improved antenna performance across multiple antenna resonances.

(22) Filed: **Nov. 5, 2014**

Related U.S. Application Data

(63) Continuation-in-part of application No. 14/286,974, filed on May 23, 2014.





US 20150061951A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0061951 A1**
(43) **Pub. Date: Mar. 5, 2015**

(54) **COMMUNICATION DEVICE AND
SMALL-SIZE MULTI-BRANCH MULTI-BAND
ANTENNA ELEMENT THEREIN**

Publication Classification

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

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

(72) Inventors: **Kin-Lu Wong**, New Taipei City (TW);
Po-Wei Lin, New Taipei City (TW)

(52) **U.S. Cl.**
CPC **H01Q 9/0407** (2013.01)
USPC **343/749**

(73) Assignee: **Acer Incorporated**, New Taipei City
(TW)

(57) **ABSTRACT**

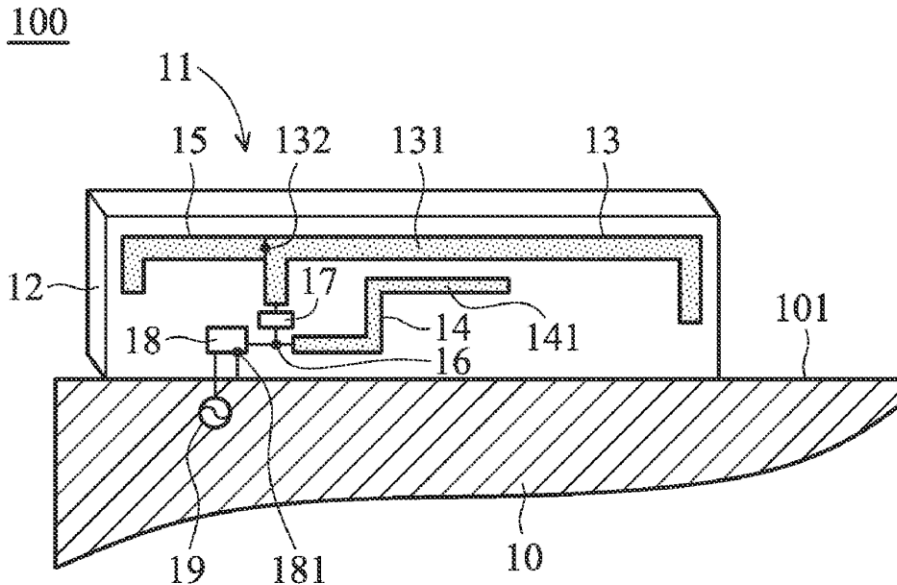
A communication device including a ground element and an antenna element is provided. The antenna element has a first connection point, and at least includes a first branch, a second branch, and a third branch. One end of the first branch is coupled through an inductive element to the first connection point. One end of the second branch is coupled to the first connection point. A second segment of the second branch is substantially parallel to a first segment of the first branch. The second branch is disposed between the first branch and an edge of the ground element. One end of the third branch is coupled to a second connection point on the first branch. The third branch and the first branch substantially extend in opposite directions. The first connection point is further coupled through a high-pass matching circuit to a signal source.

(21) Appl. No.: **14/084,242**

(22) Filed: **Nov. 19, 2013**

(30) **Foreign Application Priority Data**

Sep. 3, 2013 (TW) 102131619





US 20150061952A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0061952 A1**

(43) **Pub. Date: Mar. 5, 2015**

(54) **BROADBAND ANTENNA**

Publication Classification

(71) Applicant: **Wistron NeWeb Corporation**, Hsinchu (TW)

(51) **Int. Cl.**
H01Q 5/00 (2006.01)

(72) Inventors: **Yu-Yu Chiang**, Hsinchu (TW);
Yen-Cheng Chen, Hsinchu (TW);
Kuan-Hsueh Tseng, Hsinchu (TW);
Chia-Tien Li, Hsinchu (TW)

(52) **U.S. Cl.**
CPC **H01Q 5/0041** (2013.01)
USPC **343/749**

(57) **ABSTRACT**

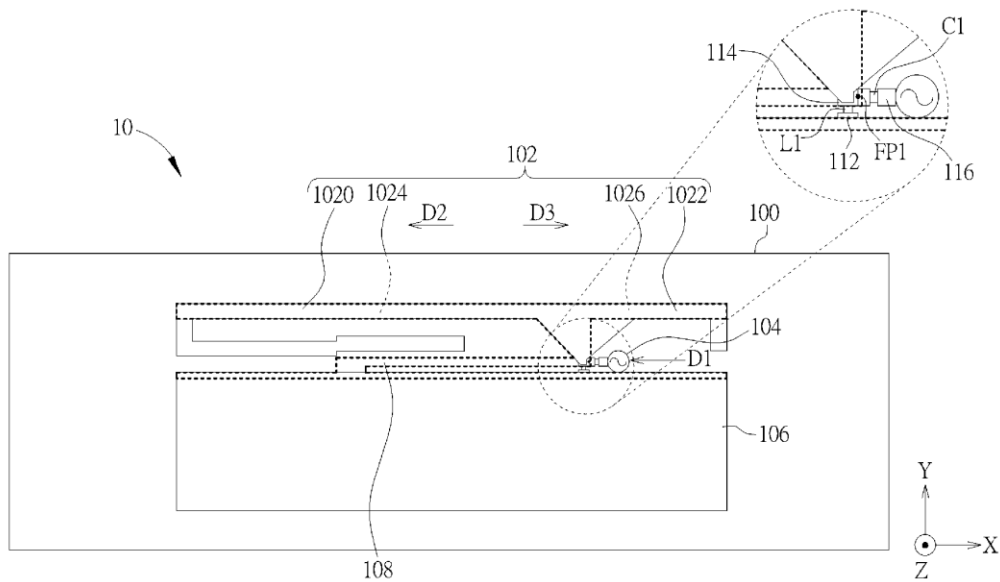
A broadband antenna for a wireless transceiver includes a grounding unit for grounding; a radiating part; a signal feed-in element for transmitting a radio signal to the radiating part in order to emit the radio signal via the radiating part, where a grounding terminal of the signal feed-in element is electrically connected to the grounding unit; a feed-in point, located on the radiating part; a capacitor, electrically connected between the feed-in point and the signal feed-in element; and an inductor, having a first terminal electrically connected to the capacitor.

(21) Appl. No.: **14/329,996**

(22) Filed: **Jul. 14, 2014**

(30) **Foreign Application Priority Data**

Sep. 3, 2013 (TW) 102131720





US 20150061953A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0061953 A1**

(43) **Pub. Date: Mar. 5, 2015**

(54) **ANTENNA AND ELECTRONIC DEVICE**

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

(71) Applicant: **Wistron NeWeb Corporation**, Hsinchu (TW)

CPC **H01Q 5/0024** (2013.01); **H01Q 1/48** (2013.01); **H01Q 1/2258** (2013.01)
USPC **343/749**

(72) Inventors: **Chia-Tien Li**, Hsinchu (TW);
Kuan-Hung Ho, Hsinchu (TW); **Yang Tai**, Hsinchu (TW); **Ta-Lung Yen**, Hsinchu (TW)

(57) **ABSTRACT**

(21) Appl. No.: **14/339,461**

An antenna for an electronic device includes a grounding sheet for providing grounding, a metal sheet having a shape substantially corresponding to a rectangular with a first section at a first corner, a feed-in unit electrically connected to the metal sheet corresponding to a second corner adjacent to the first corner of the rectangular, for transmitting electromagnetic energy, and a shorting wall electrically connected to the grounding sheet and a first side of the metal sheet, for forming a resonating cavity, wherein the first side is opposite to a second side of the metal sheet, and the second side is adjacent to the first and second corners, wherein a length and a width of the rectangular are respectively related to frequency ranges of at least one operating frequency band, and the first section increases a frequency range of a first frequency band of the operating frequency bands.

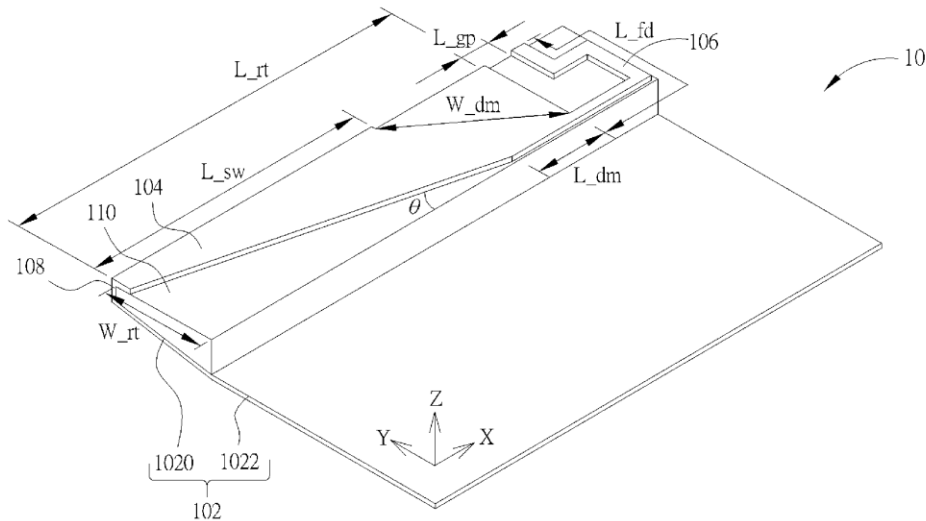
(22) Filed: **Jul. 24, 2014**

(30) **Foreign Application Priority Data**

Sep. 5, 2013 (TW) 102132042

Publication Classification

(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 1/22 (2006.01)
H01Q 1/48 (2006.01)





US 20150061954A1

(19) **United States**

(12) **Patent Application Publication**
CHANG

(10) **Pub. No.: US 2015/0061954 A1**

(43) **Pub. Date: Mar. 5, 2015**

(54) **ANTENNA ASSEMBLY**

Publication Classification

(71) Applicant: , New Taipei (TW)

(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 13/10 (2006.01)

(72) Inventor: **TZE-HSUAN CHANG**, New Taipei (TW)

(52) **U.S. Cl.**
CPC **H01Q 5/0041** (2013.01); **H01Q 13/10** (2013.01)
USPC **343/767**

(21) Appl. No.: **14/468,008**

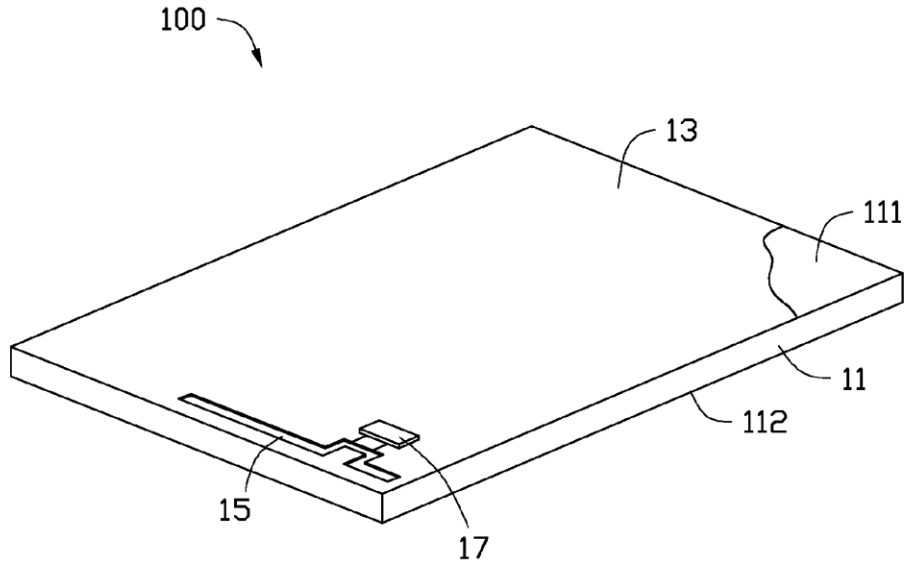
(57) **ABSTRACT**

(22) Filed: **Aug. 25, 2014**

An antenna assembly includes a base board. A ground plane is positioned on the base board and is configured to provide a ground for the antenna assembly. An antenna is formed by removing a portion of the ground plane to define a slot antenna. A matching unit is electronically connected to the antenna and is configured to match an impedance of the antenna and adjust a bandwidth of the antenna.

(30) **Foreign Application Priority Data**

Aug. 28, 2013 (CN) 2013205292191





US 20150061960A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0061960 A1**

(43) **Pub. Date: Mar. 5, 2015**

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

(52) **U.S. Cl.**
CPC **H01Q 5/0041** (2013.01); **H01Q 5/0062** (2013.01)
USPC **343/861**; 343/700 MS

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

(57) **ABSTRACT**

(72) Inventors: **GENG-HONG LIOU**, Tu-Cheng (TW);
YEN-HUI LIN, Tu-Cheng (TW)

An antenna structure includes a monopole antenna, a short parasitic antenna and an impedance matching circuit. The monopole antenna includes a first radiating body, a second radiating body and a feeding portion coupled to the first radiating body and the second radiating body. The first radiating body configured to excite a low-frequency resonating mode; the second radiating body configured to excite a first high-frequency resonating mode. The short parasitic antenna includes a parasitic body spaced apart from the second radiating body and a grounding portion coupled to the parasitic body. The short parasitic antenna configured to excite a second high-frequency resonating mode, and resonate with the second radiating body to excite a third high-frequency resonating mode. The impedance matching circuit includes a variable capacitor configured to regulate operating frequency band of the low-frequency resonating mode.

(21) Appl. No.: **14/471,304**

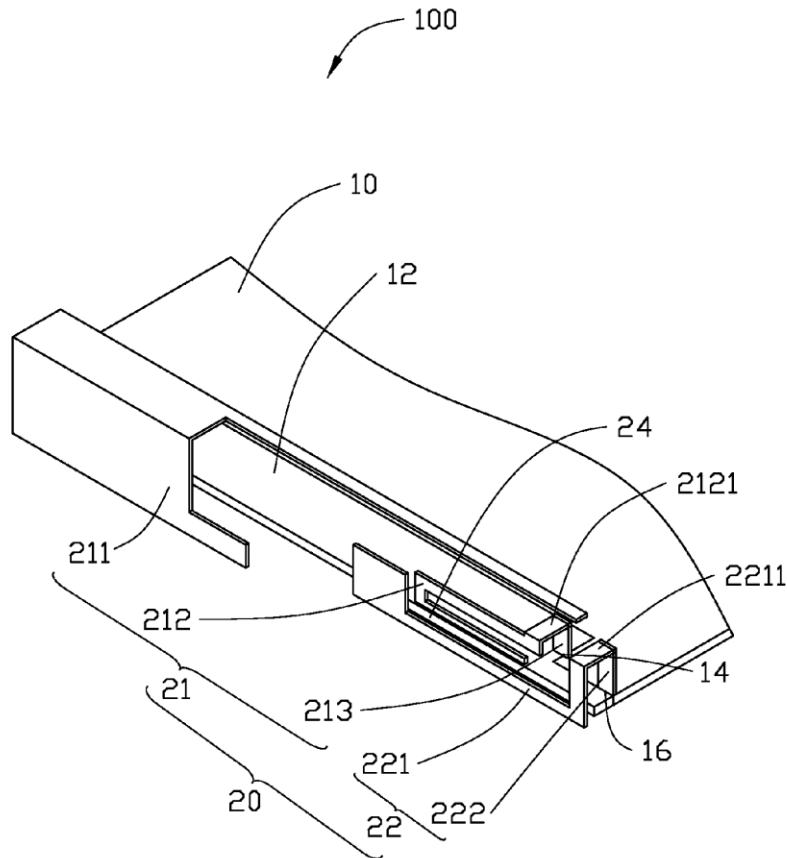
(22) Filed: **Aug. 28, 2014**

(30) **Foreign Application Priority Data**

Aug. 30, 2013 (CN) 2013103858768

Publication Classification

(51) **Int. Cl.**
H01Q 5/00 (2006.01)





US 20150061962A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0061962 A1**
(43) **Pub. Date: Mar. 5, 2015**

(54) **ANTENNA MODULE**

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

(71) Applicant: **QUANTA COMPUTER INC.**, Tao Yuan Hsien (TW)

CPC **H01Q 1/521** (2020.01)
USPC **343/893**

(72) Inventors: **Chi-Hsuan LEE**, Tao Yuan Hsien (TW);
Pei-Ling TENG, Tao Yuan Hsien (TW);
Kuo-Cheng CHEN, Tao Yuan Hsien (TW)

(57) **ABSTRACT**

(21) Appl. No.: **14/303,028**

An antenna module includes a grounding element, first and second radiating conductors, and a decoupling unit. The grounding element has first and second grounding ends. The first radiating conductor includes a first feed-in end that is adjacent spacedly to the first grounding end and that is configured to be fed with a first RF signal. The second radiating conductor includes a second feed-in end that is adjacent spacedly to the second grounding end and that is configured to be fed with a second RF signal. The decoupling unit is connected electrically between a portion of the first radiating conductor and a portion of the second radiating conductor that are proximate to each other, and is one of a decoupling capacitor and a decoupling inductor.

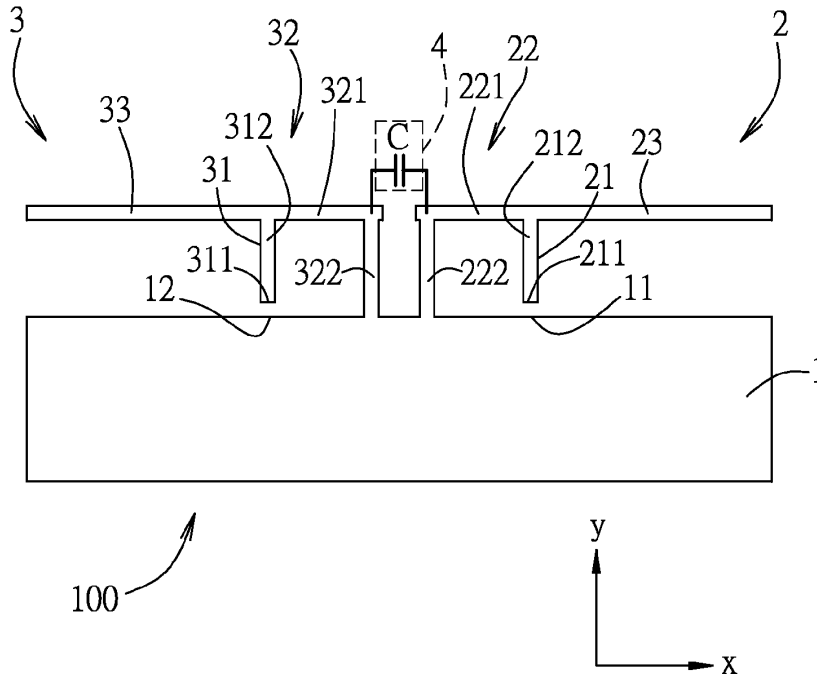
(22) Filed: **Jun. 12, 2014**

(30) **Foreign Application Priority Data**

Sep. 5, 2013 (TW) 102131999

Publication Classification

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





US 20150061963A1

(19) **United States**

(12) **Patent Application Publication**

Noda et al.

(10) **Pub. No.: US 2015/0061963 A1**

(43) **Pub. Date: Mar. 5, 2015**

(54) **MULTIBAND ANTENNA AND MANUFACTURING METHOD THEREOF**

Publication Classification

(71) Applicants: **Hiroyuki Noda, Mie (JP); Tomokazu Sonozaki, Mie (JP)**

(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 1/38 (2006.01)
H01Q 9/04 (2006.01)

(72) Inventors: **Hiroyuki Noda, Mie (JP); Tomokazu Sonozaki, Mie (JP)**

(52) **U.S. Cl.**
CPC **H01Q 5/0072** (2013.01); **H01Q 9/0407** (2013.01); **H01Q 1/38** (2013.01)
USPC **343/893; 29/600**

(73) Assignee: **NTN CORPORATION, Osaka (JP)**

(57) **ABSTRACT**

(21) Appl. No.: **14/384,884**

A multiband antenna includes a first antenna unit (10) and a second antenna unit (20). The first antenna unit (10) includes a first antenna pattern (11) formed of a conductor and a first substrate (12) formed of a dielectric, for holding the first antenna pattern (11). The second antenna unit (20) includes a second antenna pattern (21) formed of a conductor and a second substrate (22) formed of a dielectric having a dielectric constant different from the dielectric constant of the first substrate (12), for holding the second antenna pattern (21). In the multiband antenna, by injection molding the second substrate (22) with the first antenna unit (10) and the second antenna pattern (21), which being insert components, the first antenna unit (10) and the second antenna unit (20) are integrated.

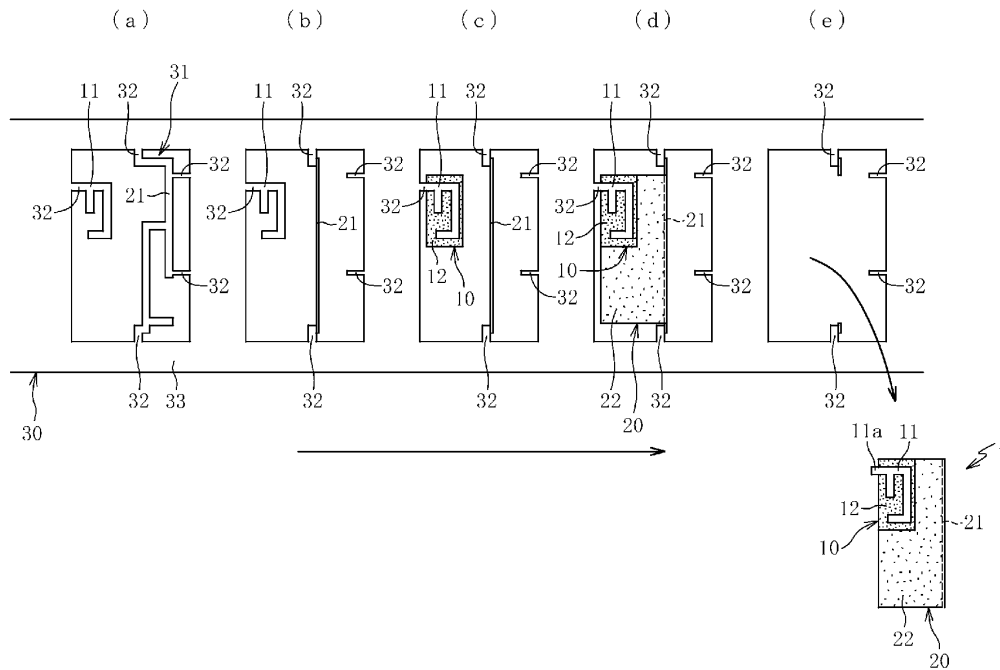
(22) PCT Filed: **Mar. 14, 2013**

(86) PCT No.: **PCT/JP2013/057251**

§ 371 (c)(1),
(2) Date: **Sep. 12, 2014**

(30) **Foreign Application Priority Data**

Mar. 16, 2012 (JP) 2012-060231





US 20150065066A1

(19) **United States**

(12) **Patent Application Publication**
Kang

(10) **Pub. No.: US 2015/0065066 A1**
(43) **Pub. Date: Mar. 5, 2015**

(54) **APPARATUS AND METHOD FOR SETTING ANTENNA RESONANT MODE OF MULTI-PORT ANTENNA STRUCTURE**

(52) **U.S. Cl.**
CPC *H04B 1/48* (2013.01)
USPC *455/78*

(71) Applicant: **MEDIATEK INC.**, Hsin-Chu (TW)
(72) Inventor: **Ting-Wei Kang**, Kaohsiung City (TW)
(21) Appl. No.: **14/339,423**
(22) Filed: **Jul. 23, 2014**

(57) **ABSTRACT**

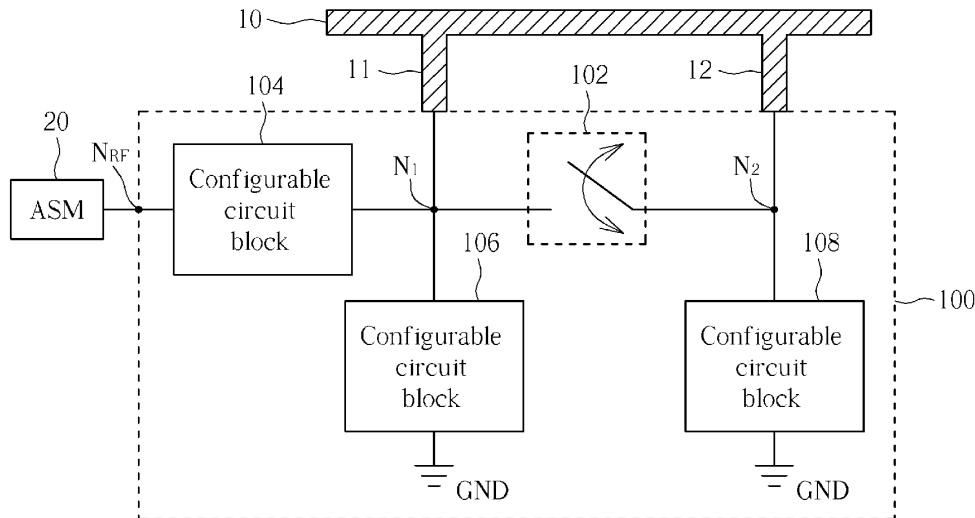
An antenna tuning circuit for setting an antenna resonant mode of an antenna structure includes a switch arranged to selectively couple a first interconnection node to a second interconnection node, wherein the first interconnection node is coupled to a first port of the antenna structure, and the second interconnection node is coupled to a second port of the antenna structure. An antenna tuning method for setting an antenna resonant mode of an antenna structure includes generating a first control signal and selectively coupling a first interconnection node to a second interconnection node in response to the first control signal, wherein the first interconnection node is coupled to a first port of the antenna structure, and the second interconnection node is coupled to a second port of the antenna structure.

Related U.S. Application Data

(60) Provisional application No. 61/872,939, filed on Sep. 3, 2013.

Publication Classification

(51) **Int. Cl.**
H04B 1/48 (2006.01)





US 20150070219A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0070219 A1**
(43) **Pub. Date: Mar. 12, 2015**

(54) **HYBRID ANTENNA FOR A PERSONAL ELECTRONIC DEVICE**

Publication Classification

(71) Applicant: **Apple Inc.**, Cupertino, CA (US)

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 21/00 (2006.01)
H01Q 1/36 (2006.01)

(72) Inventors: **Richard Hung Minh Dinh**, Santa Clara, CA (US); **Hao XU**, Cupertino, CA (US); **Jayesh NATH**, Cupertino, CA (US); **Peter I. BEVELACQUA**, San Jose, CA (US); **Jennifer M. EDWARDS**, San Francisco, CA (US); **Daniel W. JARVIS**, Sunnyvale, CA (US); **Jared M. KOLE**, San Jose, CA (US); **Mattia PASCOLINI**, Campbell, CA (US); **Robert W. SCHLUB**, Cupertino, CA (US); **Ruben CABALLERO**, San Jose, CA (US)

(52) **U.S. Cl.**
CPC **H01Q 1/243** (2013.01); **H01Q 1/36** (2013.01); **H01Q 21/00** (2013.01)
USPC **343/702**; 343/700 MS; 343/893; 29/600

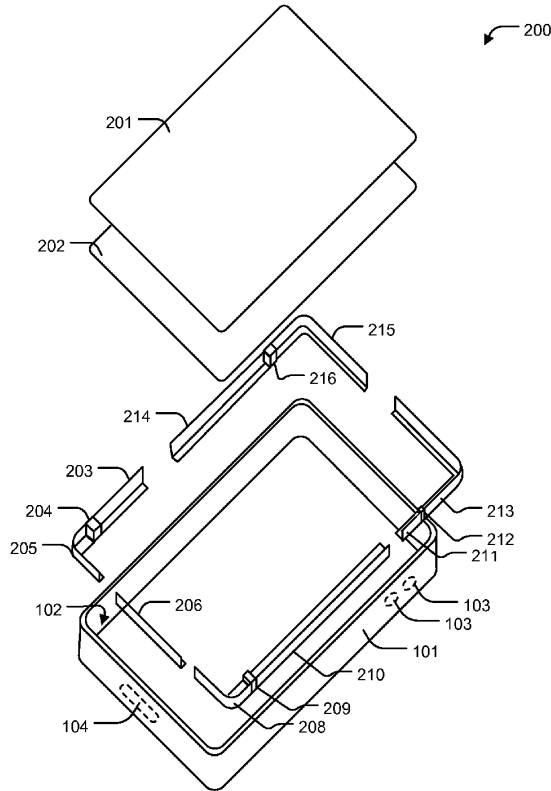
(73) Assignee: **Apple Inc.**, Cupertino, CA (US)

(57) **ABSTRACT**

(21) Appl. No.: **14/020,687**

A housing for a personal electronic device is described herein. The housing may include at least one modular subassembly configured to be arranged within an internal cavity of the housing. The at least one modular subassembly is aligned with a feature external to the housing, is affixed to an interior surface of the internal cavity, and is configured to function both as an antenna and as an internal support member of the housing. A hybrid antenna is also described herein. The hybrid antenna can include first and second flexible members capable of facilitating wireless communication, where the first and second flexible members are affixed to one another via a metal member.

(22) Filed: **Sep. 6, 2013**





US 20150070223A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0070223 A1**

(43) **Pub. Date: Mar. 12, 2015**

(54) **ANTENNA PATTERN FRAME, METHOD AND MOLD FOR MANUFACTURING THE SAME, AND ELECTRONIC DEVICE**

(30) **Foreign Application Priority Data**

Apr. 23, 2009 (KR) 10-2009-0035637

(71) Applicant: **SAMSUNG ELECTRO-MECHANICS CO., LTD.**, Suwon (KR)

Publication Classification

(72) Inventors: **Jae Suk SUNG**, Yongin (KR); **Ki Won CHANG**, Suwon (KR); **Ha Ryong HONG**, Hwaseong (KR); **Chang Mok HAN**, Cheonan (KR); **Chan Gwang AN**, Suwon (KR); **Duk Woo LEE**, Suwon (KR); **Hyun Kil NAM**, Suwon (KR); **Dae Kyu LEE**, Suwon (KR); **Sang Woo BAE**, Suwon (KR); **Byung Hwa LEE**, Suwon (KR)

(51) **Int. Cl.**

H01Q 1/24 (2006.01)
B29C 45/14 (2006.01)

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

CPC **H01Q 1/243** (2013.01); **B29C 45/14065** (2013.01); **B29K 2101/00** (2013.01)
USPC **343/702**; 264/272.14; 425/123

(73) Assignee: **SAMSUNG ELECTRO-MECHANICS CO., LTD.**

(57) **ABSTRACT**

ABSTRACT

An antenna pattern frame according to an aspect of the invention may include: a radiator having an antenna pattern portion transmitting and receiving a signal; a ground portion extending from the antenna pattern portion; a connection portion connecting the antenna pattern portion and the ground portion to be arranged in different planes; and a radiator frame manufactured by injection molding on the radiator so that the antenna pattern portion may be provided on one side of the radiator frame and the connection terminal portion may be provided on the other side thereof, the radiator frame allowing the antenna pattern portion to be embedded in the electronic device case.

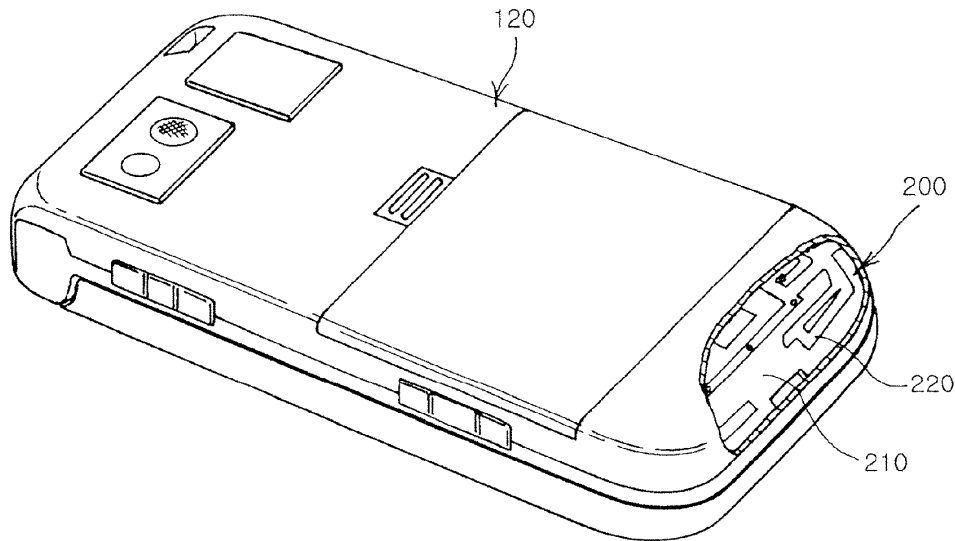
(21) Appl. No.: **14/547,000**

(22) Filed: **Nov. 18, 2014**

Related U.S. Application Data

(63) Continuation of application No. 12/649,820, filed on Dec. 30, 2009.

100





US 20150070224A1

(19) **United States**

(12) **Patent Application Publication**
NAKANO

(10) **Pub. No.: US 2015/0070224 A1**

(43) **Pub. Date: Mar. 12, 2015**

(54) **ANTENNA APPARATUS AND COMMUNICATION TERMINAL**

Publication Classification

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

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

(72) Inventor: **Shinichi NAKANO**, Nagaokakyo-shi
(JP)

(52) **U.S. Cl.**
CPC **H01Q 1/2208** (2013.01); **H01Q 7/00**
(2013.01)
USPC **343/702**

(21) Appl. No.: **14/547,381**

(57) **ABSTRACT**

(22) Filed: **Nov. 19, 2014**

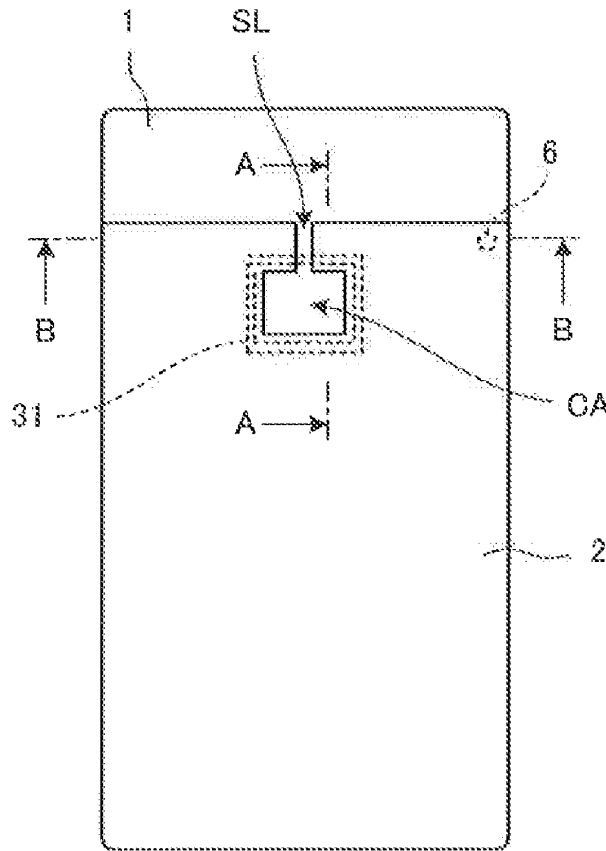
In an antenna apparatus, on an undersurface of a metal cover, a feeding coil module is disposed. In a casing, a printed circuit board is included. A ground conductor, a feeding pin, and a ground connection conductor are disposed on the printed circuit board. When the metal cover is mounted on the casing, the feeding pin is in contact with a connection portion of the feeding coil module and is electrically connected thereto. The ground connection conductor is in contact with the metal cover and connects the metal cover to the ground conductor. The ground connection conductor is disposed at either side of a slit outside an area in which the current density of an induced current flowing through the metal cover is in a range from a maximum value to approximately 80% of the maximum value or one side of the slit in the area.

Related U.S. Application Data

(63) Continuation of application No. 13/570,521, filed on
Aug. 9, 2012, now Pat. No. 8,922,438.

(30) **Foreign Application Priority Data**

Aug. 10, 2011 (JP) 2011-174490
Jun. 1, 2012 (JP) 2012-126395





US 20150070226A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0070226 A1**
(43) **Pub. Date: Mar. 12, 2015**

(54) **WRIST-WORN COMMUNICATION DEVICE**

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

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

CPC **H01Q 1/273** (2013.01)

USPC **343/718**

(72) Inventors: **Kin-Lu Wong**, New Taipei City (TW);
Hung-Jen Hsu, New Taipei City (TW)

(57) **ABSTRACT**

(73) Assignee: **Acer Incorporated**, New Taipei City (TW)

A communication device, including a device casing, an external connection element, and a first metal element, is provided. A ground element and an antenna element are disposed in the device casing. The ground element has a first edge, a second edge, and a first connection point. The first edge and the second edge are opposite to each other. The first connection point is disposed near or at the second edge. The antenna element is disposed near the first edge. The external connection element is formed by a non-conductive material and is outside the device casing. The external connection element has a belt-like structure and is combined with the device casing to substantially form a loop structure. The first metal element is supported by the external connection element and is coupled to the first connection point of the ground element.

(21) Appl. No.: **14/060,628**

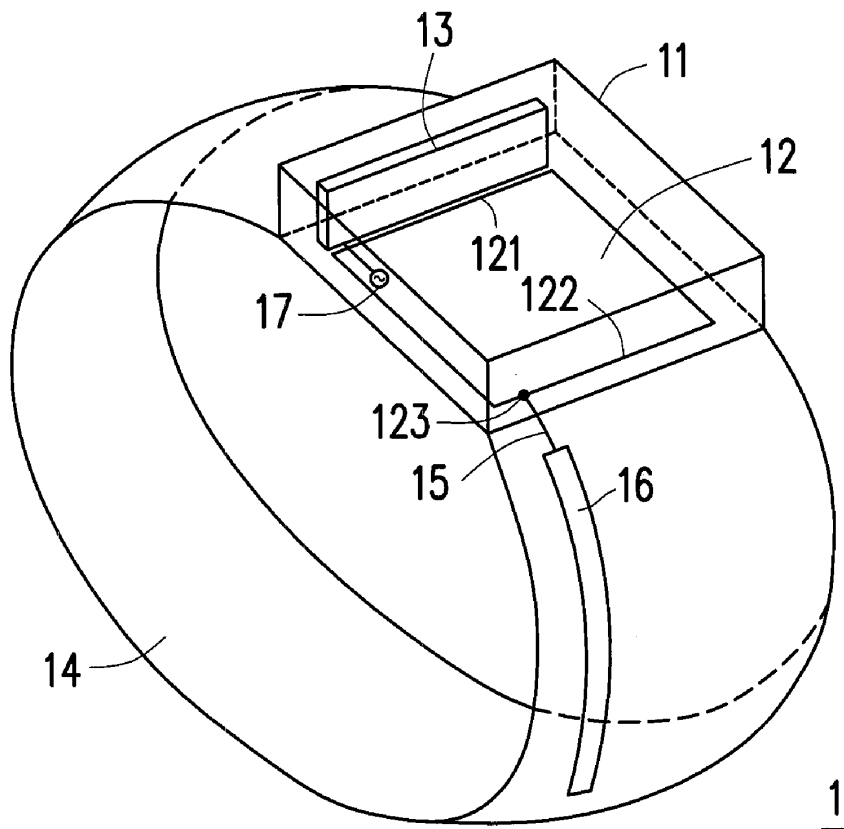
(22) Filed: **Oct. 23, 2013**

(30) **Foreign Application Priority Data**

Sep. 10, 2013 (TW) 102132605

Publication Classification

(51) **Int. Cl.**
H01Q 1/27 (2006.01)





US 20150070237A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0070237 A1**

(43) **Pub. Date: Mar. 12, 2015**

(54) **ANTENNA ASSEMBLY WITH HIGH ISOLATION**

(52) **U.S. Cl.**
CPC *H01Q 1/526* (2013.01); *H01Q 9/045* (2013.01)
USPC **343/841**

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

(72) Inventors: **TZU-YAO HWANG**, New Taipei (TW);
LUNG-SHENG TAI, New Taipei (TW)

(57) **ABSTRACT**

(21) Appl. No.: **14/477,892**

(22) Filed: **Sep. 5, 2014**

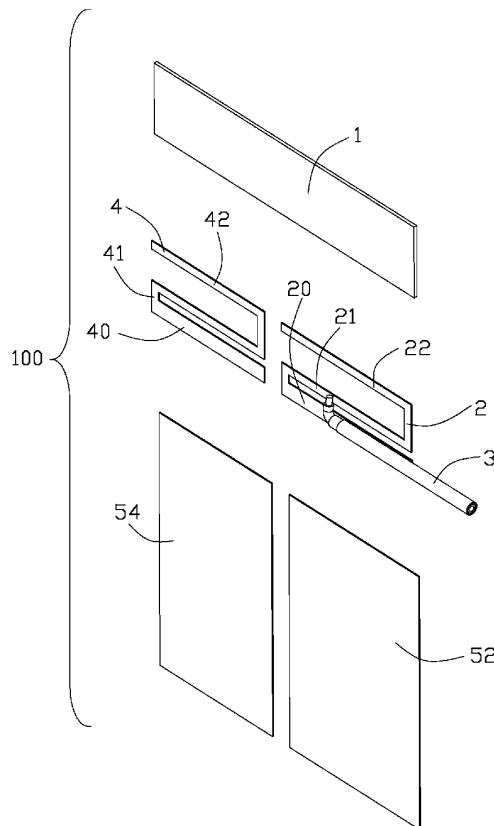
(30) **Foreign Application Priority Data**

Sep. 9, 2013 (TW) 102132333

Publication Classification

(51) **Int. Cl.**
H01Q 1/52 (2006.01)
H01Q 9/04 (2006.01)

An antenna assembly includes a main body, a coaxial cable connecting the main body and an isolating member located beside the main body. The main body includes a grounding portion extending in a longitudinal direction, a radiating portion extending in the longitudinal direction and a connecting portion connecting the grounding portion and the radiating portion. The coaxial cable includes an inner conductor connecting the connecting portion and an outer conductor surrounding the inner conductor and connecting the grounding portion. The isolating member located beside the main body in a side by side manner and defined a gap therebetween.





US 20150070239A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0070239 A1**
(43) **Pub. Date: Mar. 12, 2015**

(54) **ANTENNA**

Publication Classification

(71) Applicant: **MEDIATEK Inc.**, Hsin-Chu City (TW)

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

(72) Inventors: **Kuo-Fong Hung**, Changhua City (TW);
Chia-Wei Chi, Taipei City (TW);
Shih-Huang Yeh, Hsinchu City (TW)

(52) **U.S. Cl.**
CPC . **H01Q 1/48** (2013.01); **H01Q 9/045** (2013.01)
USPC **343/848**

(73) Assignee: **MEDIATEK Inc.**, Hsin-Chu City (TW)

(57) **ABSTRACT**

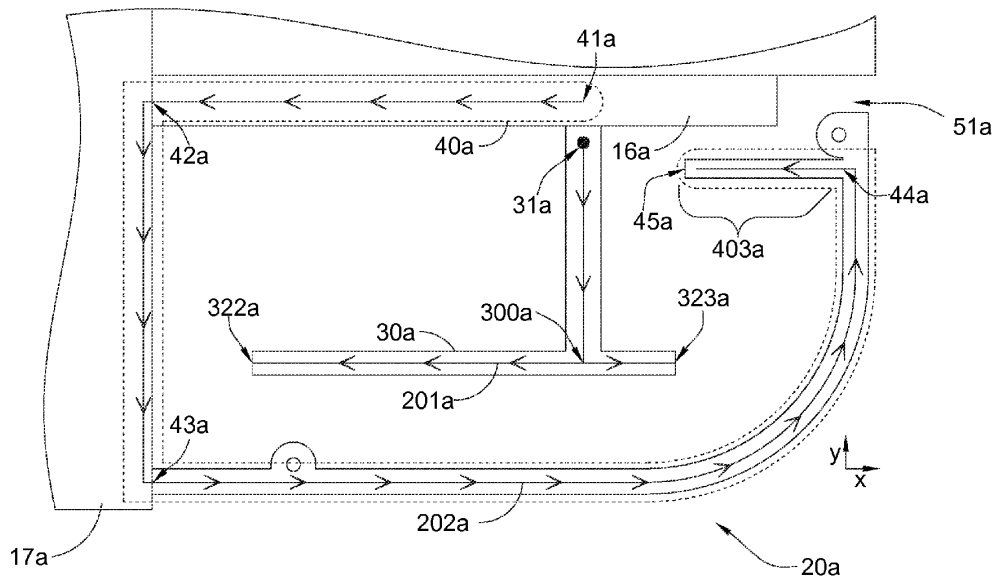
(21) Appl. No.: **14/277,085**

The invention provides an antenna for a wireless device, e.g., a cellular phone for wireless mobile telecommunication. The antenna includes a conductive feed strip and a conductive ground component. The ground component is for connecting a ground voltage, and comprises a portion along a surface of the device. The feed strip has a feed port for relaying a feed signal, and does not physically contact the ground component, so as to feed the ground component by noncontact electrical coupling, instead of physical contact.

(22) Filed: **May 14, 2014**

Related U.S. Application Data

(60) Provisional application No. 61/875,800, filed on Sep. 10, 2013.





US 20150077292A1

(19) **United States**

(12) **Patent Application Publication**
Kalistaja

(10) **Pub. No.: US 2015/0077292 A1**

(43) **Pub. Date: Mar. 19, 2015**

(54) **DEPOSITED THREE-DIMENSIONAL ANTENNA APPARATUS AND METHODS**

(71) Applicant: **Pulse Finland Oy, Kempele (FI)**

(72) Inventor: **Esa Kalistaja, Oulu (FI)**

(21) Appl. No.: **14/031,646**

(22) Filed: **Sep. 19, 2013**

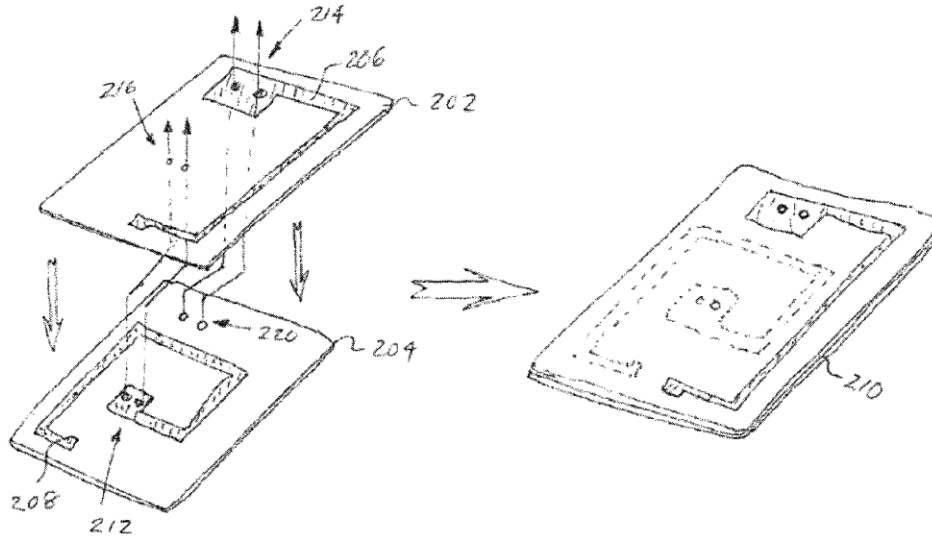
Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 1/36 (2006.01)

(52) **U.S. Cl.**
CPC : **H01Q 1/243** (2013.01); **H01Q 1/36** (2013.01)
USPC **343/702; 343/906; 29/601**

(57) **ABSTRACT**

A "thin" and cost-effective three-dimensional antenna assembly and methods of use and manufacturing thereof. In one exemplary embodiment, the solution of the present disclosure is particularly adapted for small form-factor portable radio devices, and comprises an antenna (or array of antennas) deposited on a thin preformed flexible or deformable structure using a conductive fluid. The antenna (array) includes one or more antennas each having a radiator and a plurality of contacts. Use of the thin preformed structure allows, among other things, thinner form factors for the host wireless device, and obviates use of a separate molded carrier or other more costly or involved processes (such as laser direct structuring).





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(19) **United States**

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WONG et al.

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(43) **Pub. Date: Mar. 19, 2015**

(54) **RF RADIATION REDIRECTION AWAY FROM PORTABLE COMMUNICATION DEVICE USER**

(60) Provisional application No. 61/160,282, filed on Mar. 13, 2009, provisional application No. 61/112,141, filed on Nov. 6, 2008, provisional application No. 61/158,551, filed on Mar. 9, 2009.

(71) Applicant: **PONG RESEARCH CORPORATION**, Encinitas, CA (US)

Publication Classification

(72) Inventors: **Alfred Y. WONG**, Los Angeles, CA (US); **Robert MORENO**, Acton, CA (US); **Karl Richard SHIELDS**, North Hills, CA (US); **Rong WANG**, Sherman Oaks, CA (US)

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 7/00 (2006.01)
H01Q 9/04 (2006.01)

(73) Assignee: **PONG RESEARCH CORPORATION**, Encinitas, CA (US)

(52) **U.S. Cl.**
CPC **H01Q 1/243** (2013.01); **H01Q 9/0407** (2013.01); **H01Q 7/00** (2013.01)
USPC **343/702**

(21) Appl. No.: **14/551,775**

(57) **ABSTRACT**

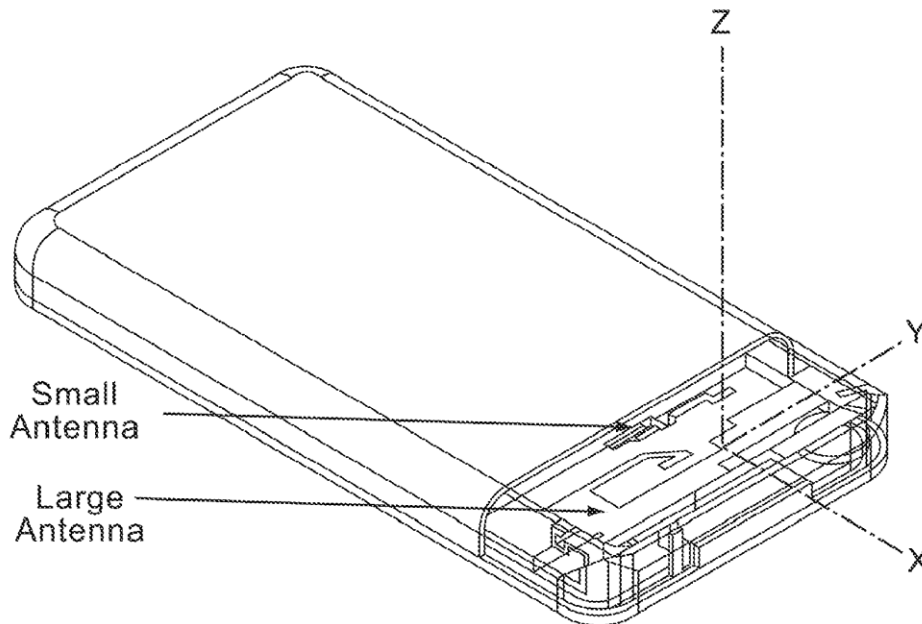
(22) Filed: **Nov. 24, 2014**

A case for a wireless device includes a number of RF coupling elements mounted in the case and configured such that RF radiation is coupled from an internal antenna of the wireless device out of the device to a first RF coupling element, and from the first RF coupling element to a RF redirector coupling element that redirects the RF radiation in a direction outward from said wireless device that is opposite to a user side of the wireless device. A corrugated metallic shield is optionally provided on an opposite side of the case, facing a user of the device.

Related U.S. Application Data

(63) Continuation of application No. 13/492,518, filed on Jun. 8, 2012, now Pat. No. 8,897,843, which is a continuation of application No. 12/724,290, filed on Mar. 15, 2010, now Pat. No. 8,214,003, which is a continuation-in-part of application No. 12/614,132, filed on Nov. 6, 2009, now Pat. No. 8,208,980.

Reference - iPhone Model





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(19) **United States**

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

(10) **Pub. No.: US 2015/0077298 A1**
(43) **Pub. Date: Mar. 19, 2015**

(54) **MOBILE DEVICE AND ANTENNA
STRUCTURE USING IONIC POLYMER
METAL COMPOSITE THEREIN**

Publication Classification

(71) Applicant: **HTC Corporation**, Taoyuan City (TW)

(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 3/00 (2006.01)

(72) Inventors: **Chien-Chih CHEN**, Taoyuan City (TW);
Guo-Dung SU, Taipei City (TW);
Yen-Liang KUO, Taoyuan City (TW);
Wan-Ming CHEN, Taoyuan City (TW);
Chun-Wei TSENG, Taoyuan City (TW)

(52) **U.S. Cl.**
CPC *H01Q 5/0031* (2013.01); *H01Q 3/00* (2013.01)
USPC **343/749**

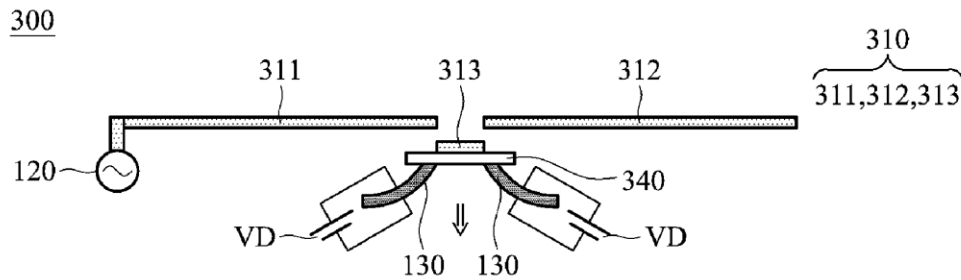
(73) Assignee: **HTC Corporation**, Taoyuan City (TW)

(57) **ABSTRACT**

(21) Appl. No.: **14/030,538**

A mobile device includes an antenna structure, a signal source, and an IPMC (Ionic Polymer Metal Composite). The signal source is configured to excite the antenna structure. The IPMC is configured as a flexible actuator to adjust a resonant length of the antenna structure in such a manner that the antenna structure is capable of operating in multiple bands.

(22) Filed: **Sep. 18, 2013**





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(19) **United States**

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

(10) **Pub. No.: US 2015/0077307 A1**

(43) **Pub. Date: Mar. 19, 2015**

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

(52) **U.S. Cl.**
CPC ... **H01Q 7/00** (2013.01); **H01Q 1/50** (2013.01)
USPC **343/861**; 343/866

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

(57) **ABSTRACT**

(72) Inventors: **GENG-HONG LIOU**, New Taipei (TW); **YEN-HUI LIN**, New Taipei (TW)

(21) Appl. No.: **14/481,151**

(22) Filed: **Sep. 9, 2014**

(30) **Foreign Application Priority Data**

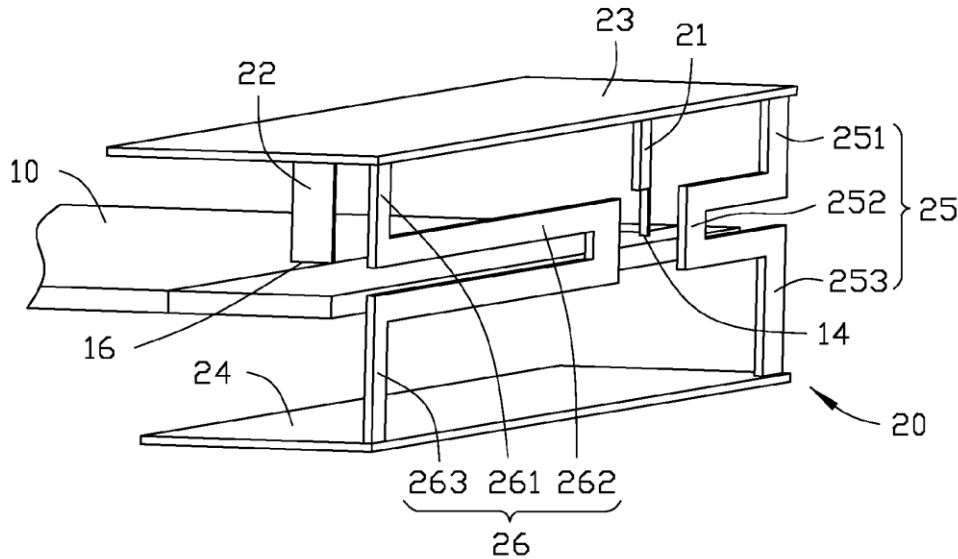
Sep. 18, 2013 (CN) 2013104251042

Publication Classification

(51) **Int. Cl.**
H01Q 7/00 (2006.01)
H01Q 1/50 (2006.01)

An antenna structure includes a feeding portion, a grounding portion, a first radiating body, a second radiating body, a first coupling portion and a second coupling portion. The first radiating body is electronically coupled to the grounding portion and the feeding portion. The second radiating body is positioned apart from the first radiation body. The first coupling portion is electronically coupled between the first radiating body and the second radiating body. The second coupling portion faces the first coupling portion and is electronically coupled between the first and second radiating bodies. The first and second radiating bodies, and the first and second coupling portions cooperatively define a loop antenna.

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(19) **United States**

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Chen et al.

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(43) **Pub. Date: Mar. 19, 2015**

(54) **MOBILE TERMINAL**

Publication Classification

(75) Inventors: **Yajun Chen**, Shenzhen (CN); **Shougang Cheng**, Shenzhen (CN); **Jun Shen**, Shenzhen (CN); **Yu Qin**, Shenzhen (CN)

(51) **Int. Cl.**
H04M 1/02 (2006.01)

(73) Assignee: **ZTE Corporation**, Shenzhen, Guangdong Province (CN)

(52) **U.S. Cl.**
CPC **H04M 1/026** (2013.01)
USPC **455/575.7**

(21) Appl. No.: **14/396,602**

(57) **ABSTRACT**

(22) PCT Filed: **Jun. 20, 2012**

(86) PCT No.: **PCT/CN2012/077258**

§ 371 (e)(1),
(2), (4) Date: **Oct. 23, 2014**

(30) **Foreign Application Priority Data**

Apr. 23, 2012 (CN) 201220176420.1

Disclosed is a mobile terminal. The mobile terminal comprises an antenna body and a metal ring. The metal ring is provided on the mobile terminal without contacting the antenna body, and the vertical projection of the metal ring on a plane where the antenna body is located intersects the antenna body. By means of the disclosure, signal receiving performance of the mobile terminal is improved, and the loss caused by head and hand is reduced to a certain extent.

