



US 20150145731A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0145731 A1**

(43) **Pub. Date: May 28, 2015**

(54) **ELECTRONIC DEVICE**

(30) **Foreign Application Priority Data**

(71) Applicants: **INVENTEC CORPORATION**, Taipei (TW); **Inventec (Pudong) Technology Corporation**, Shanghai (CN)

Nov. 22, 2013 (CN) 201310597424.6

Publication Classification

(72) Inventors: **Wei-Chang JHANG**, Taipei (TW); **Chun-Sheng WU**, Taipei (TW); **Chih-Cheng LI**, Taipei (TW)

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

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

(73) Assignees: **INVENTEC CORPORATION**, Taipei (TW); **Inventec (Pudong) Technology Corporation**, Shanghai (CN)

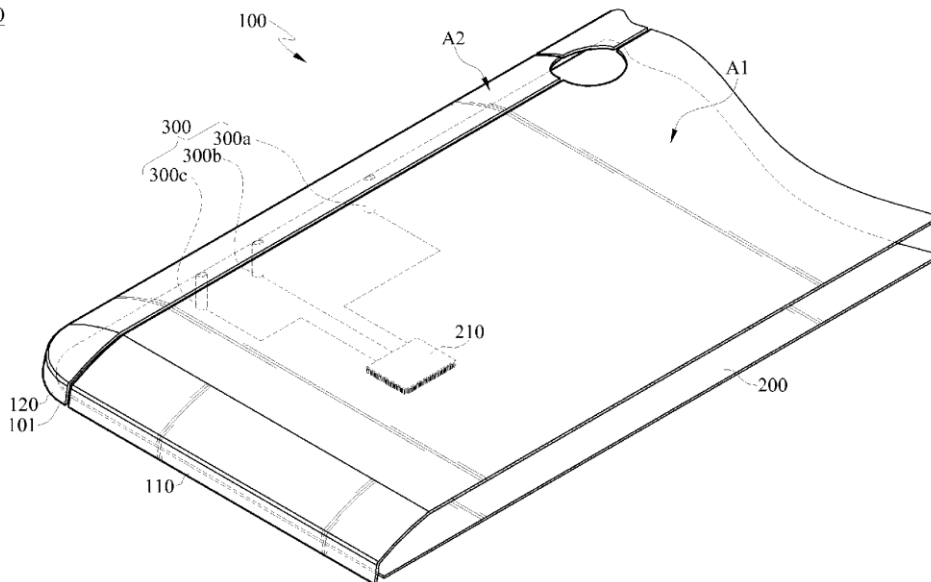
(57) **ABSTRACT**

The disclosure relates to an electronic device including a metallic shell. The electronic device is characterized in that the metallic shell has a groove. The groove separates the metallic shell into a main portion and an antenna portion. The main portion and the antenna are electrically insulated from each other.

(21) Appl. No.: **14/242,558**

(22) Filed: **Apr. 1, 2014**

10





US 20150145732A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0145732 A1**

(43) **Pub. Date: May 28, 2015**

(54) **DISPLAY APPARATUS PROVIDED WITH ANTENNAS**

(52) **U.S. Cl.**
CPC **H01Q 1/24** (2013.01)

(71) Applicant: **Kabushiki Kaisha Toshiba**, Tokyo (JP)

(57) **ABSTRACT**

(72) Inventors: **Takashi Minemura**, Ome-shi (JP);
Takayuki Saito, Isesaki-shi (JP)

(21) Appl. No.: **14/461,020**

(22) Filed: **Aug. 15, 2014**

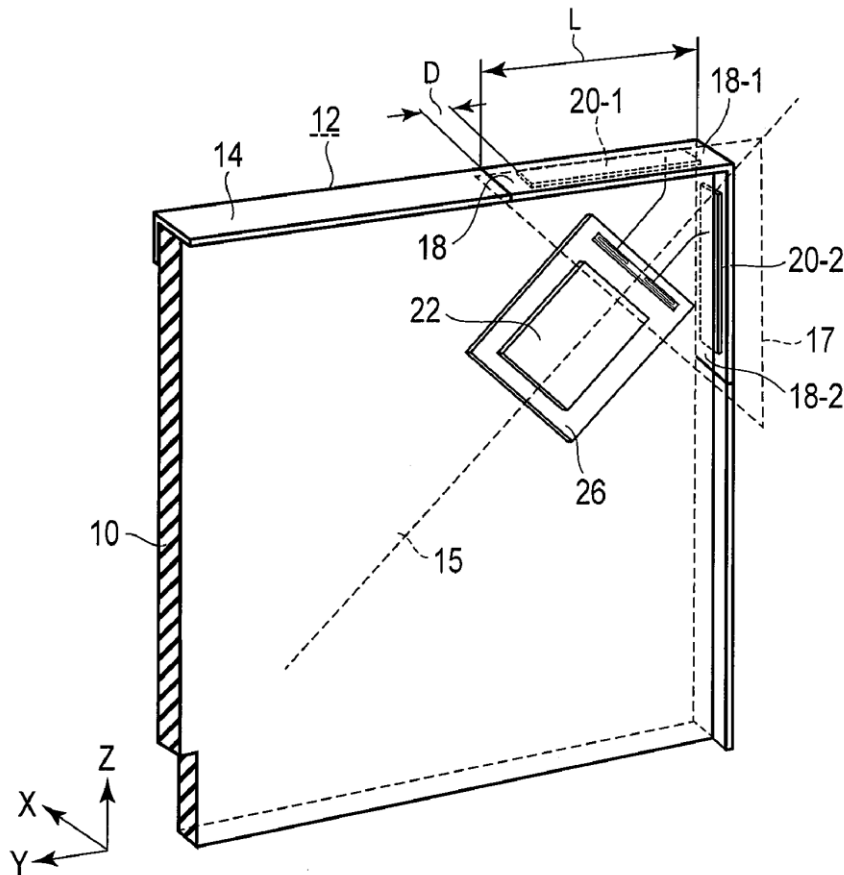
Related U.S. Application Data

(60) Provisional application No. 61/909,219, filed on Nov. 26, 2013.

Publication Classification

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

In a display apparatus according to one embodiment, a substantially oblong display panel has a flat placement area adjacent to one corner on a back surface, and a frame retaining the display panel is composed of four metal bezel members attached to four sides, and two nonconductive bezel members attached to two sides in order to extend two metal bezel members and constituting a substantially L-shape. A triangular area is defined by the two nonconductive bezel members. A pair of antennas is provided in the flat placement area so as to be substantially symmetrical with respect to a bisector bisecting a corner. An antenna module provided on the placement area drives the antennas in order to constitute a group of antennas communicating at a same time in a same system.





US 20150145734A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0145734 A1**

(43) **Pub. Date: May 28, 2015**

(54) **ANTENNA SYSTEM WITH ANTENNA SWAPPING AND ANTENNA TUNING**

H04B 1/401 (2006.01)

H01Q 7/00 (2006.01)

H01Q 21/28 (2006.01)

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

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

CPC **H01Q 1/243** (2013.01); **H01Q 7/00** (2013.01); **H01Q 21/28** (2013.01); **H04B 1/401** (2013.01); **H04M 1/0202** (2013.01)

(72) Inventors: **Ruben Caballero**, San Jose, CA (US); **Mattia Pascolini**, San Francisco, CA (US); **Mohit Narang**, Cupertino, CA (US); **Matt A. Mow**, Los Altos, CA (US); **Robert W. Schlub**, Cupertino, CA (US)

(57) **ABSTRACT**

Electronic devices may be provided that contain wireless communications circuitry. The wireless communications circuitry may include radio-frequency transceiver circuitry and first and second antennas. An electronic device may include a housing. The first antenna may be located at an upper end of the housing and the second antenna may be located at a lower end of the housing. A peripheral conductive member may run around the edges of the housing and may be used in forming the first and second antennas. The radio-frequency transceiver circuitry may have a transmit-receive port and a receive port. Switching circuitry may connect the first antenna to the transmit-receive port and the second antenna to the receiver port or may connect the first antenna to the receiver port and the second antenna to the transmit-receive port.

(21) Appl. No.: **14/608,048**

(22) Filed: **Jan. 28, 2015**

Related U.S. Application Data

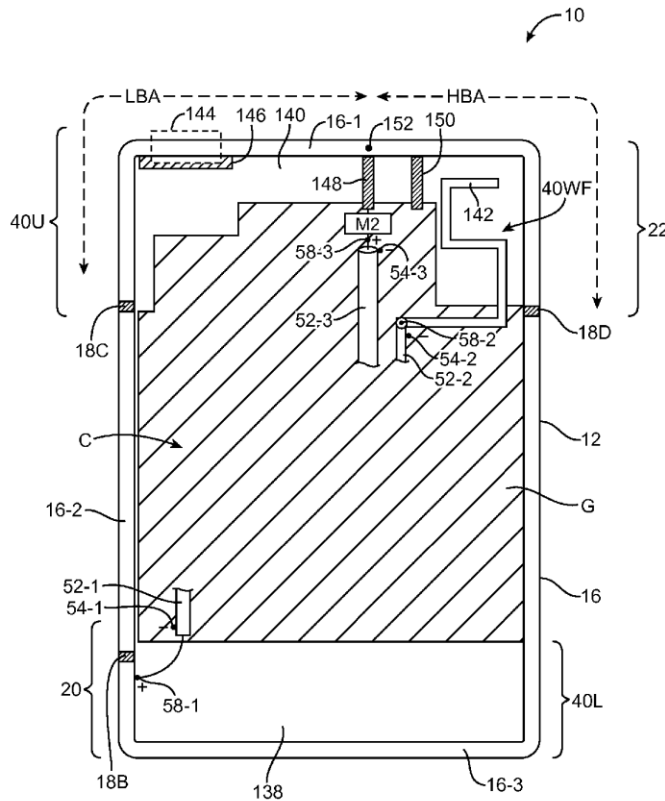
(63) Continuation of application No. 12/941,011, filed on Nov. 5, 2010, now Pat. No. 8,947,302.

Publication Classification

(51) **Int. Cl.**

H01Q 1/24 (2006.01)

H04M 1/02 (2006.01)





US 20150145735A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0145735 A1**
(43) **Pub. Date: May 28, 2015**

(54) **ANTENNA**

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

(71) Applicant: **Huawei Device Co., Ltd.**, Shenzhen (CN)

CPC **H01Q 7/00** (2013.01); **H01Q 9/0407** (2013.01)

(72) Inventors: **Yi Fan**, Shenzhen (CN); **Bo Meng**, Shenzhen (CN); **Dongxing Tu**, Shenzhen (CN); **Shuhui Sun**, Shenzhen (CN); **Zhongying Long**, Shenzhen (CN)

(57) **ABSTRACT**

(21) Appl. No.: **14/586,465**

The present invention discloses an antenna and pertains to the field of communications technologies. The antenna includes: a printed circuit board, a first antenna feeding structure, a first antenna loading structure, and a first filter, where the first antenna feeding structure has a grounding pin and a feeding pin, the grounding pin and the feeding pin are separately connected to the printed circuit board, and the first antenna loading structure and a partial structure of the first antenna feeding structure form a coupling structure; and the first antenna loading structure is connected to the first filter, the first filter is connected to the printed circuit board, and the first filter is configured to cut off a low-frequency current. A low-frequency current is cut off by using a filter, so as to implement selective filtering for an antenna loading structure and extend operating bandwidth of the antenna.

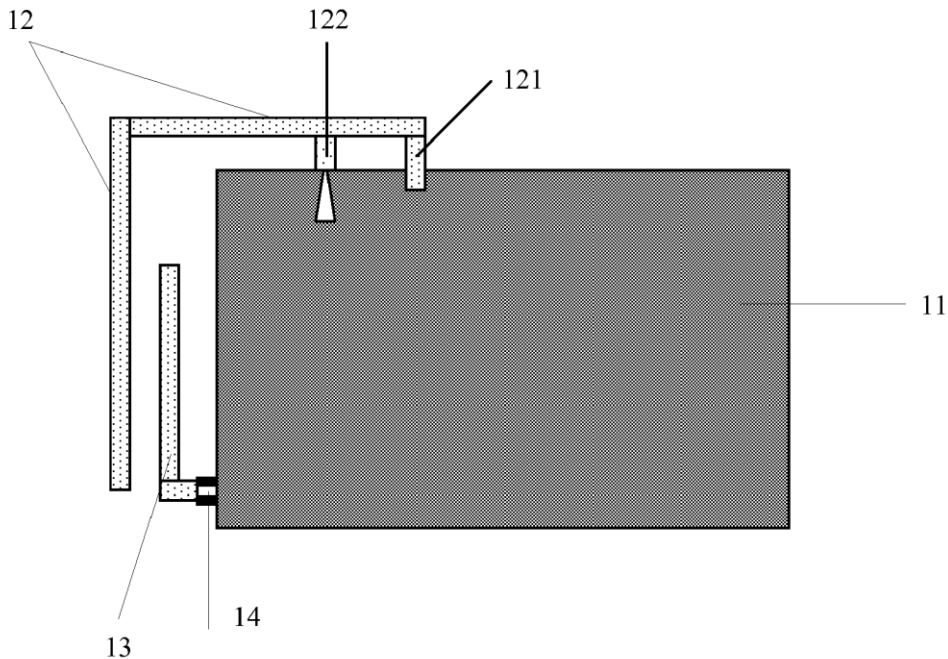
(22) Filed: **Dec. 30, 2014**

Related U.S. Application Data

(63) Continuation of application No. PCT/CN2013/087692, filed on Nov. 22, 2013.

Publication Classification

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





US 20150145738A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0145738 A1**

(43) **Pub. Date: May 28, 2015**

(54) **COMMUNICATION DEVICE WITH
COUPLED-FED MULTIBAND ANTENNA
ELEMENT**

(52) **U.S. Cl.**
CPC **H01Q 5/0041** (2013.01); **H01Q 9/0457**
(2013.01)

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

(57) **ABSTRACT**

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

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

A communication device includes a ground element and an antenna element. The antenna element is disposed on a dielectric substrate which is adjacent to an edge of the ground element. The antenna element includes a radiating element, a shorting element and a feeding element. The radiating element has a first open end, a second open end and a shorting point. The radiating element is divided into a first element and a second element by the shorting point. The first element includes the first open end, and the second element includes the second open end. One end of the shorting element is coupled to the shorting point through a first inductive element, and another end is electrically connected to the ground element. The feeding element and the first element are spaced by a coupling gap, and the feeding element is coupled to a signal source through a matching circuit.

(21) Appl. No.: **14/165,509**

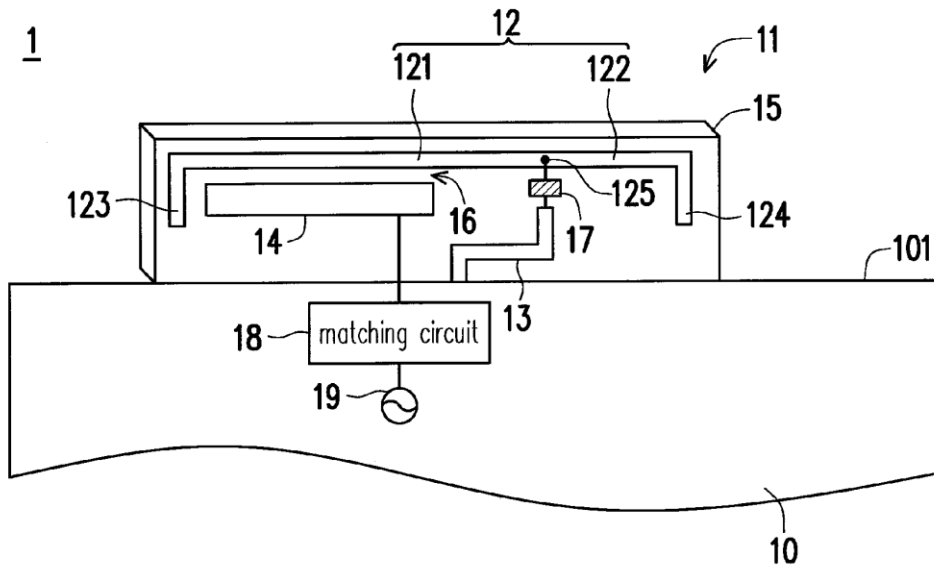
(22) Filed: **Jan. 27, 2014**

(30) **Foreign Application Priority Data**

Nov. 22, 2013 (TW) 102142678

Publication Classification

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





US 20150145740A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0145740 A1**

(43) **Pub. Date: May 28, 2015**

(54) **INTEGRATED FREQUENCY MULTIPLIER
AND SLOT ANTENNA**

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

CPC *H01Q 13/10* (2013.01); *H01G 13/006*
(2013.01); *H01Q 19/00* (2013.01)

(71) Applicant: **LSI Corporation**, San Jose, CA (US)

(72) Inventors: **Roger A. Fratti**, Mohnton, PA (US);
Albert Torressen, Bronx, NY (US);
James R. McDaniel, Nazareth, PA (US);
Scott W. McLellan, Kempton, PA (US)

(57) **ABSTRACT**

(73) Assignee: **LSI Corporation**, San Jose, CA (US)

(21) Appl. No.: **14/132,881**

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

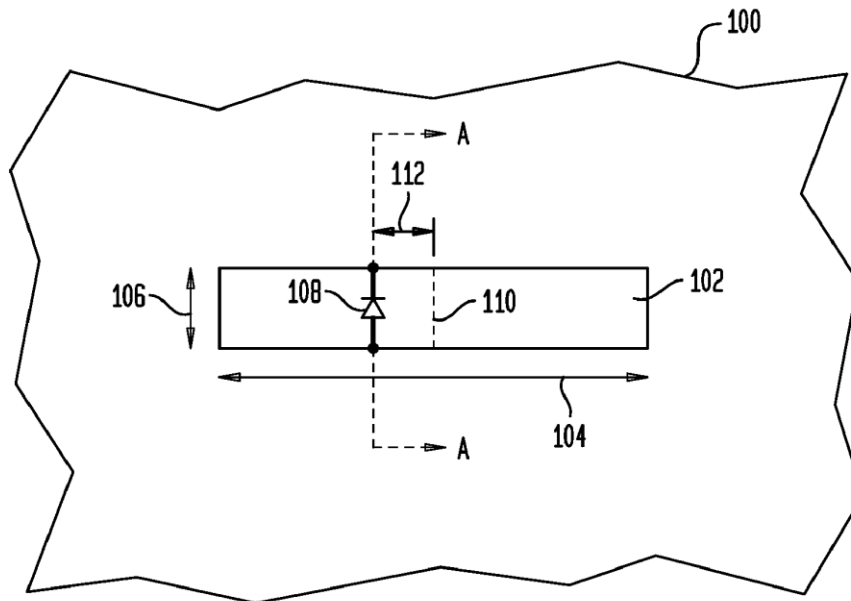
Related U.S. Application Data

(60) Provisional application No. 61/908,914, filed on Nov.
26, 2013.

Publication Classification

(51) **Int. Cl.**
H01Q 13/10 (2006.01)
H01Q 19/00 (2006.01)
H01G 13/00 (2006.01)

A metal substrate with a slot therein forms a slot antenna, the slot having a major axis and a minor axis. A dielectric layer has a plurality of terminals disposed on or in the dielectric layer and the layer is attached on one surface of the substrate. The terminals of a non-linear device, such as a diode, are connected to corresponding terminals of the dielectric layer. The non-linear device is positioned proximate the slot and is substantially aligned with a minor axis of the slot. A transmission line feeds an RF signal to the non-linear device that in turn frequency multiplies the RF signal to an RF signal that is radiated by the slot antenna. The dielectric layer is positioned in the slot such that the radiated RF signal has a desired output power. A protective layer is applied to the other surface of the substrate to cover the slot.





US 20150145744A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0145744 A1**
(43) **Pub. Date: May 28, 2015**

(54) **TUNABLE ANTENNA**

Publication Classification

(71) Applicants: **Yeh-Chun Kao**, Taipei City (TW);
You-Fu Cheng, Taipei City (TW);
Yu-Chia Chang, Taipei City (TW)

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

(72) Inventors: **Yeh-Chun Kao**, Taipei City (TW);
You-Fu Cheng, Taipei City (TW);
Yu-Chia Chang, Taipei City (TW)

(52) **U.S. Cl.**
CPC **H01Q 9/0442** (2013.01); **H01Q 9/045**
(2013.01)

(73) Assignee: **ASUSTeK COMPUTER INC.**, Taipei City (TW)

(57) **ABSTRACT**

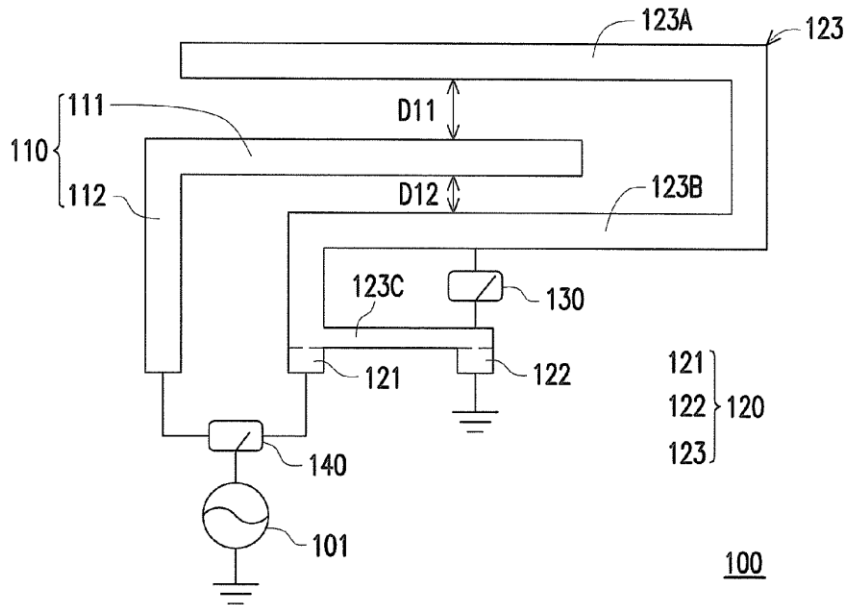
A tunable antenna including a first radiating element, a second radiating element, a connection circuit and a switch circuit is provided. The first radiating element includes a coupling portion and a first feeding portion. The second radiating element includes a second feeding portion, a grounding portion and a radiation portion. The grounding portion is electrically connected to a ground plane, and the radiation portion surrounds the coupling portion to form a first coupling gap and the second coupling gap. The connection circuit is electrically connected to the radiation portion and a state of the connection circuit is changed according to a control signal, so as to adjust a length of the resonant path of the radiation portion. A feeding signal is transmitted to the first feeding portion or the second feeding portion by the switch circuit.

(21) Appl. No.: **14/548,310**

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

(30) **Foreign Application Priority Data**

Nov. 28, 2013 (TW) 102143486





US 20150147984A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0147984 A1**

(43) **Pub. Date: May 28, 2015**

(54) **DOUBLE RING ANTENNA WITH INTEGRATED NON-CELLULAR ANTENNAS**

Publication Classification

(71) Applicant: **Sony Corporation**, Tokyo (JP)

(51) **Int. Cl.**
H04B 1/38 (2006.01)

(72) Inventors: **Zhinong Ying**, Lung (SE); **Kun Zhao**, Stockholm (SE); **Shuai Zhang**, Solna (SE); **Sailing He**, Stockholm (SE)

(52) **U.S. Cl.**
CPC **H04B 1/3827** (2013.01)

(73) Assignee: **Sony Corporation**, Tokyo (JP)

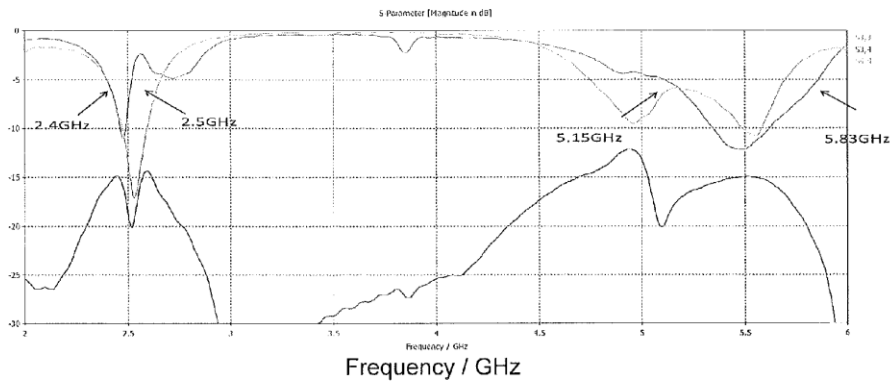
(57) **ABSTRACT**

Wireless electronic devices may include a ground plane, a double ring antenna and non-cellular antennas integrated within the double ring antenna. The double ring antenna may comprise first and second metal rings around the perimeter of a ground plane to operate as MIMO cellular antennas. At least one non-cellular antenna, such as a MIMO Wi-Fi antenna, may be integrated between the first and second metals rings on one or more sides of the wireless electronic device.

(21) Appl. No.: **14/092,529**

(22) Filed: **Nov. 27, 2013**

S-Parameter [Magnitude in dB]





US 20150155615A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0155615 A1**
(43) **Pub. Date: Jun. 4, 2015**

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

(30) **Foreign Application Priority Data**

Nov. 30, 2013 (CN) 201310622457.1

Publication Classification

(71) Applicants: **Shenzhen Futaihong Precision Industry Co., Ltd.**, Shenzhen (CN); **FIH (Hong Kong) Limited**, Kowloon (HK)

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

(72) Inventors: **XIAO-KAI LIU**, Shenzhen (CN); **CHANG-HAI GU**, Shenzhen (CN); **YAO-YAO QIN**, Shenzhen (CN); **JING-HAI ZHENG**, Shenzhen (CN)

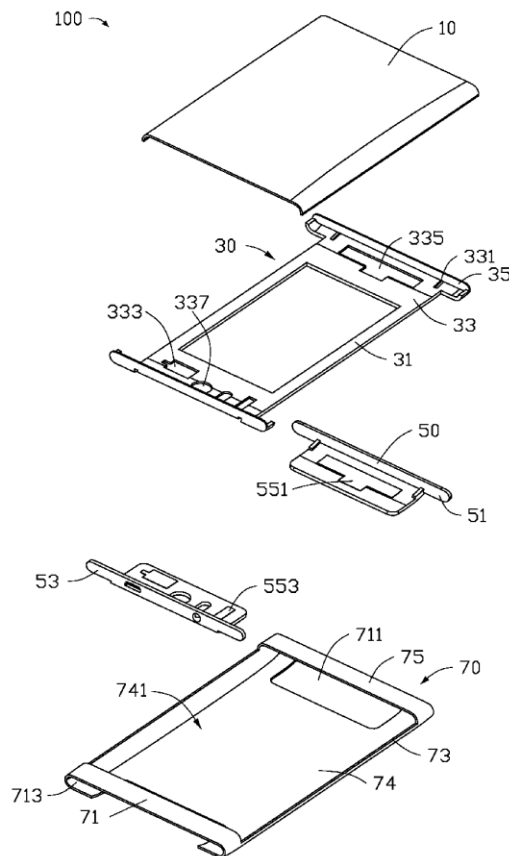
(52) **U.S. Cl.**
CPC **H01Q 1/243** (2013.01); **H01Q 21/00** (2013.01)

(21) Appl. No.: **14/487,394**

(57) **ABSTRACT**

An antenna structure includes a first carrier, a second carrier and an antenna main body. The antenna main body includes a main antenna and a sub antenna. The main antenna is printed on the first carrier, the sub antenna is printed on the second carrier. The present invention also provides a wireless communication device using the antenna structure.

(22) Filed: **Sep. 16, 2014**





US 20150155616A1

(19) **United States**

(12) **Patent Application Publication**
LIN

(10) **Pub. No.: US 2015/0155616 A1**

(43) **Pub. Date: Jun. 4, 2015**

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

Publication Classification

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

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

(52) **U.S. Cl.**
CPC *H01Q 1/243* (2013.01); *H01Q 9/0442* (2013.01)

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

(57) **ABSTRACT**

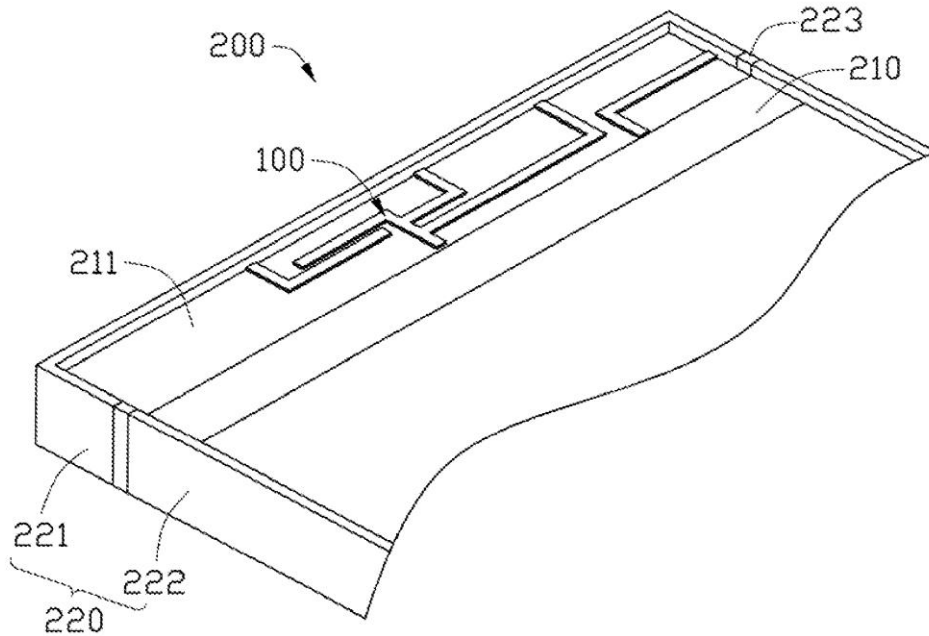
(21) Appl. No.: **14/491,430**

An antenna structure includes a first frame, a feed end, at least one ground end, a first radiator, a first extending section, a second extending section, a coupling section, and a second radiator. The first radiator is coupled to the feed end and is parallel to the first frame. The first extending section is coupled between the feed end and first frame. The second extending section is coupled between the feed end and the first frame. The coupling section is coupled to the first frame. The second radiator is coupled between the at least one ground end and the first frame.

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

(30) **Foreign Application Priority Data**

Nov. 30, 2013 (CN) 201310623053.4





US 20150155617A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0155617 A1**

(43) **Pub. Date: Jun. 4, 2015**

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

Publication Classification

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

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 5/00 (2006.01)
H01Q 9/04 (2006.01)

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

(52) **U.S. Cl.**
CPC *H01Q 1/243* (2013.01); *H01Q 9/0407* (2013.01); *H01Q 5/0027* (2013.01)

(21) Appl. No.: **14/510,530**

(57) **ABSTRACT**

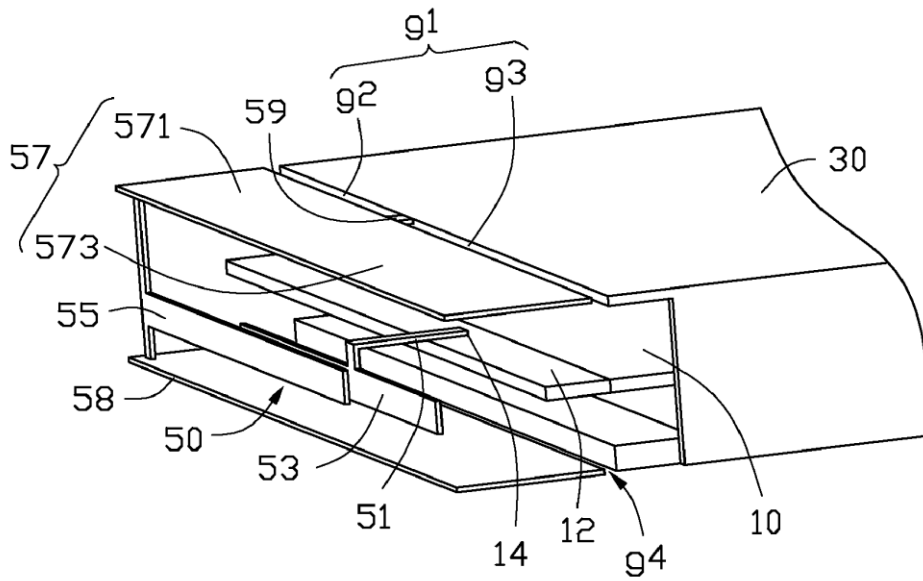
(22) Filed: **Oct. 9, 2014**

An antenna structure includes a feed portion, a ground portion, a first radiator, a second radiator, a first metallic sheet, and a second metallic sheet. The first radiator is coupled to the feed portion. The second radiator is spaced from the first radiator, and is electronically coupled to the first radiator. The first metallic sheet is coupled to the ground portion. The first metallic sheet and the second metallic sheet are connected to two opposite sides of the second radiator.

(30) **Foreign Application Priority Data**

Nov. 30, 2013 (CN) 201310622125.3

100





US 20150155618A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0155618 A1**

(43) **Pub. Date: Jun. 4, 2015**

(54) **ANTENNA DEVICE FOR A PORTABLE TERMINAL**

(30) **Foreign Application Priority Data**

Jun. 10, 2011 (KR) 10-2011-0056410

(71) Applicant: **Samsung Electronics Co., Ltd.**,
Gyeonggi-do (KR)

Publication Classification

(72) Inventors: **Sang-Jin EOM**, Gyeonggi-do (KR);
Hoon PARK, Seoul (KR); **Ho-Saeng KIM**,
Gyeonggi-do (KR); **Austin KIM**,
Gyeonggi-do (KR); **Yong-Jin KIM**,
Seoul (KR); **Chi-Hyung AHN**,
Gyeonggi-do (KR)

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

(52) **U.S. Cl.**
CPC . **H01Q 1/243** (2013.01); **H01Q 7/00** (2013.01)

(21) Appl. No.: **14/618,182**

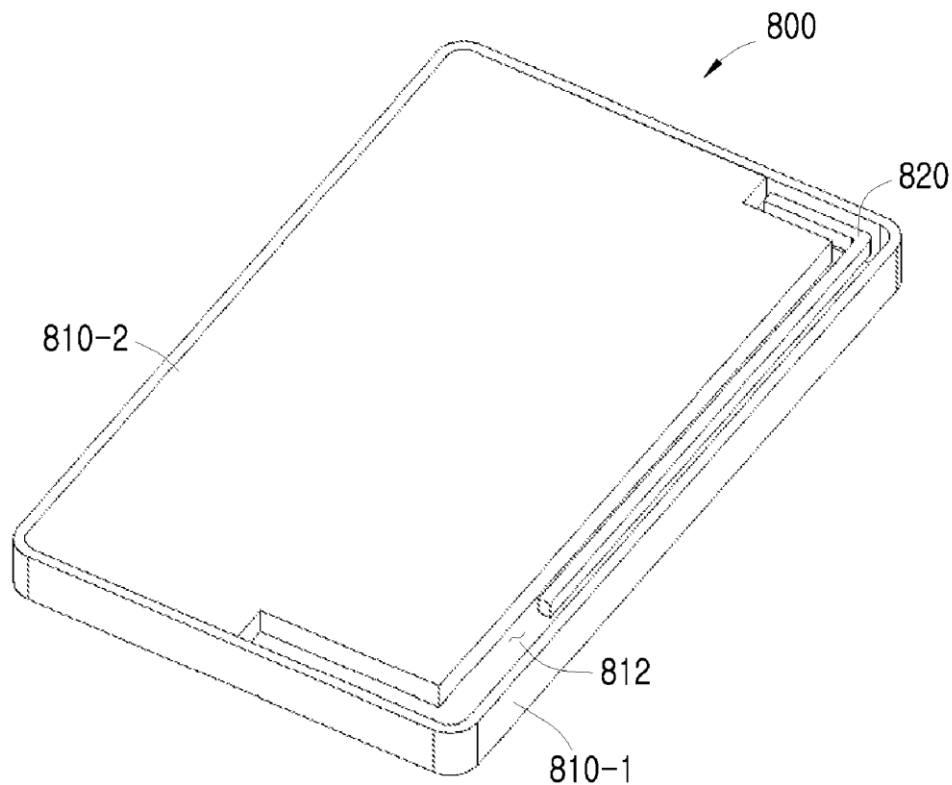
(57) **ABSTRACT**

(22) Filed: **Feb. 10, 2015**

An antenna device attains good antenna performance using at least one or more metal members installed in a portable terminal. The antenna device includes a main board equipped with a power supply part for supplying power, a slot part which is positioned in at least one or more metal members or is formed by a combination of the metal members, and a power supply antenna member for receiving power from the power supply part and which is electromagnetically coupled with the slot part.

Related U.S. Application Data

(63) Continuation of application No. 13/435,269, filed on Mar. 30, 2012, now Pat. No. 8,957,814.





US 20150155621A1

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

(10) **Pub. No.: US 2015/0155621 A1**
(43) **Pub. Date: Jun. 4, 2015**

- (54) **MULTI-BAND MIMO ANTENNA**
- (71) Applicants: **Laurent Desclos**, San Diego, CA (US); **Sebastian Rowson**, San Diego, CA (US); **Jeffrey Shamblin**, San Marcos, CA (US); **Young Cha**, San Diego, CA (US)
- (72) Inventors: **Laurent Desclos**, San Diego, CA (US); **Sebastian Rowson**, San Diego, CA (US); **Jeffrey Shamblin**, San Marcos, CA (US); **Young Cha**, San Diego, CA (US)
- (73) Assignee: **ETHERTRONICS, INC.**, San Diego, CA (US)
- (21) Appl. No.: **14/553,920**
- (22) Filed: **Nov. 25, 2014**

2011, now Pat. No. 8,717,241, which is a continuation of application No. 12/894,052, filed on Sep. 29, 2010, now Pat. No. 8,077,116, which is a continuation of application No. 11/841,207, filed on Aug. 20, 2007, now Pat. No. 7,830,320.

Publication Classification

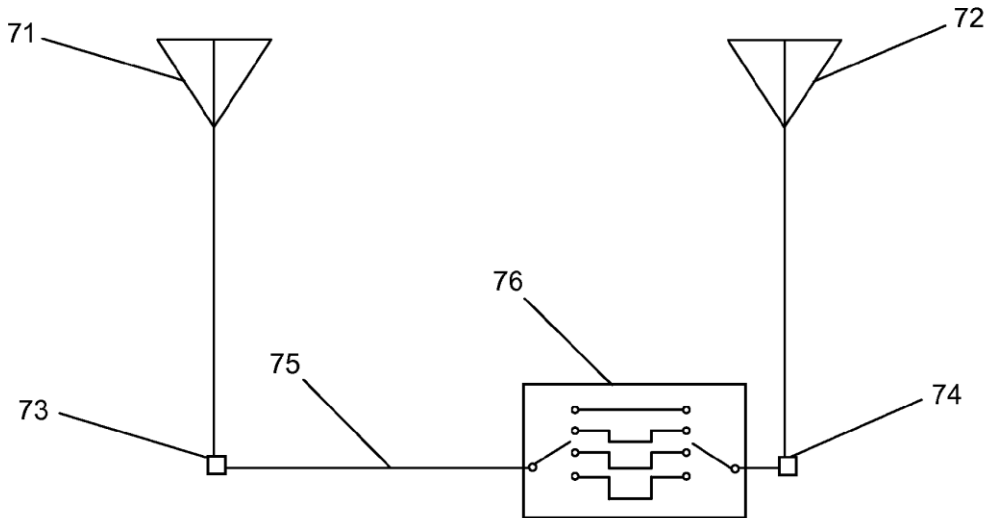
- (51) **Int. Cl.**
H01Q 1/52 (2006.01)
H01Q 21/28 (2006.01)
- (52) **U.S. Cl.**
CPC **H01Q 1/523** (2013.01); **H01Q 21/28** (2013.01)

(57) **ABSTRACT**

A multi-band antenna system for MIMO applications is adapted to provide high isolation between antennas across a wide range of frequencies. Multiple Isolated Magnetic Dipole (IMD) antennas are co-located and connected with a feed network that can include switches that adjust phase length for transmission lines connecting the antennas. Filtering is integrated into the feed network to improve rejection of unwanted frequencies. Filtering can also be implemented on the antenna structure. Either one or multi-port antennas can be used.

Related U.S. Application Data

- (60) Division of application No. 13/966,074, filed on Aug. 13, 2013, now Pat. No. 8,952,861, which is a division of application No. 13/548,221, filed on Jul. 13, 2012, now Pat. No. 8,542,158, which is a continuation-in-part of application No. 13/289,901, filed on Nov. 4,





US 20150155623A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0155623 A1**

(43) **Pub. Date: Jun. 4, 2015**

(54) **ANTENNA SYSTEM FOR INTERFERENCE SUPPRESSION**

Publication Classification

(71) Applicant: **Ethertronics, Inc.**, San Diego, CA (US)

(51) **Int. Cl.**
H01Q 3/00 (2006.01)
H01Q 19/00 (2006.01)

(72) Inventors: **Jeffrey Shamblin**, San Marcos, CA (US); **Sebastian Rowson**, San Diego, CA (US); **Laurent Desclos**, San Diego, CA (US)

(52) **U.S. Cl.**
CPC **H01Q 3/00** (2013.01); **H01Q 19/005** (2013.01)

(73) Assignee: **ETHERTRONICS, INC.**, San Diego, CA (US)

(57) **ABSTRACT**

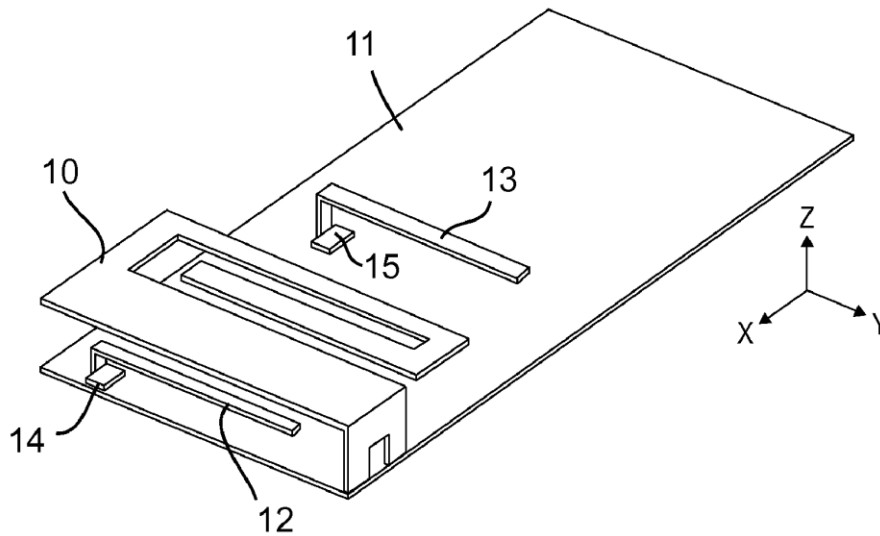
(21) Appl. No.: **14/617,612**

An antenna system is capable of optimizing communication link quality with one or multiple transceivers while suppressing one or multiple interference sources. The antenna provides a low cost, physically small multi-element antenna system capable of being integrated into mobile devices and designed to form nulls in the radiation pattern to reduce interference from unwanted interferers. The antenna system operates in both line of sight and high multi-path environments by adjusting the radiation pattern and sampling the received signal strength to reduce signal levels from interferers while monitoring and optimizing receive signal strength from desired sources.

(22) Filed: **Feb. 9, 2015**

Related U.S. Application Data

(63) Continuation of application No. 13/622,356, filed on Sep. 18, 2012, now Pat. No. 8,988,289, which is a continuation-in-part 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.





US 20150155624A1

(19) **United States**

(12) **Patent Application Publication**
Desclos

(10) **Pub. No.: US 2015/0155624 A1**

(43) **Pub. Date: Jun. 4, 2015**

(54) **MULTI LEVELED ACTIVE ANTENNA
CONFIGURATION FOR MULTIBAND MIMO
LTE SYSTEM**

(52) **U.S. Cl.**
CPC **H01Q 3/22** (2013.01)

(57) **ABSTRACT**

(71) Applicant: **Laurent Desclos**, (US)

An active antenna system and algorithm is described that provides for dynamic tuning and optimization of antenna system parameters for a MIMO system where correlation and isolation between antennas in the system are dynamically altered to provide for greater throughput. As one or multiple antennas are loaded or de-tuned due to environmental changes, corrections to correlation and/or isolation are made by selecting the optimal antenna radiation pattern and by adjusting electrical length and/or reactive loading of transmission lines connecting the antennas. Multiple Isolated Magnetic Dipole (IMD) antennas are co-located and connected with a feed network that can include switches that adjust phase length for transmission lines connecting the antennas. Filtering is integrated into the feed network to improve rejection of unwanted frequencies. Filtering can also be implemented on the antenna structure.

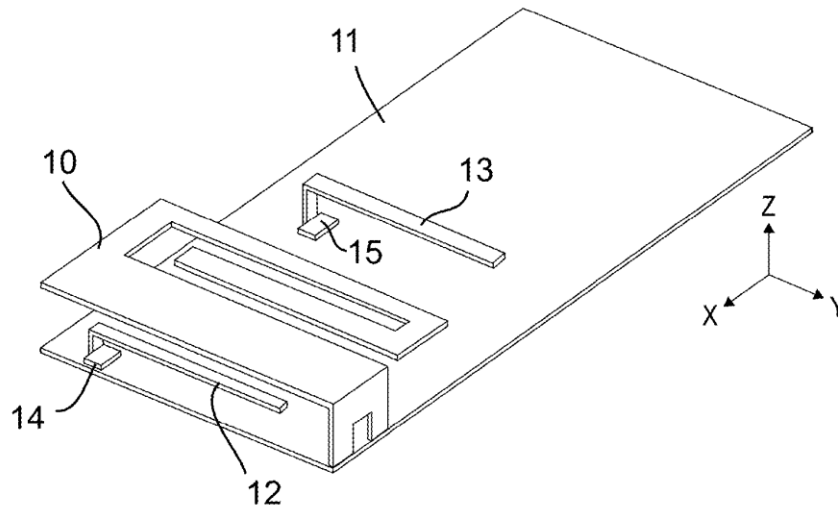
(72) Inventor: **Laurent Desclos**, (US)

(21) Appl. No.: **14/094,778**

(22) Filed: **Dec. 2, 2013**

Publication Classification

(51) **Int. Cl.**
H01Q 3/22 (2006.01)





US 20150155627A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0155627 A1**

(43) **Pub. Date: Jun. 4, 2015**

(54) **COMMUNICATION DEVICE AND ANTENNA ELEMENT THEREIN**

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

CPC *H01Q 5/0034* (2013.01); *H01Q 9/0421* (2013.01); *H01Q 9/045* (2013.01); *H01Q 9/0414* (2013.01)

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

(72) Inventors: **Kin-Lu Wong**, New Taipei City (TW);
Huan-Jyun Jiang, New Taipei City (TW)

(57) **ABSTRACT**

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

A communication device including a ground element and an antenna element is provided. The antenna element is adjacent to an edge of the ground element. The antenna element has a projection on the edge of the ground element. The antenna element includes a radiation element, a feeding element, and a shorting element. The radiation element has a first end and a second end, and the second end is open. The radiation element has plural bends such that the second end is adjacent to the first end. One end of the feeding element is coupled through a capacitive element to a connection point on the radiation element, and the connection point is adjacent to or at the first end. Another end of the feeding element is coupled to a signal source. The feeding element includes a first segment which is substantially parallel to the edge of the ground element.

(21) Appl. No.: **14/181,994**

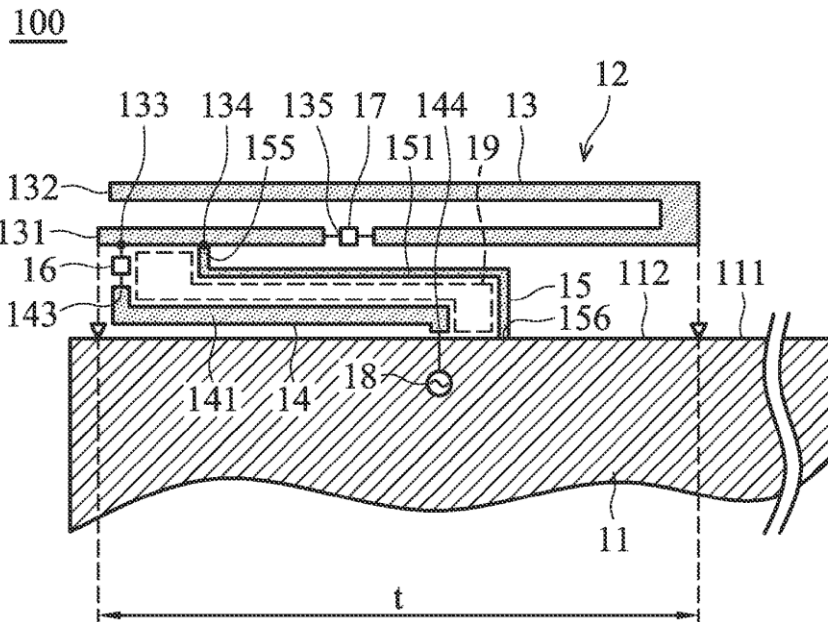
(22) Filed: **Feb. 17, 2014**

(30) **Foreign Application Priority Data**

Dec. 4, 2013 (TW) 102144361

Publication Classification

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





US 20150155632A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0155632 A1**
(43) **Pub. Date: Jun. 4, 2015**

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

Publication Classification

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

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

(72) Inventors: **CHIH-HUNG LAI**, New Taipei (TW);
YEN-HUI LIN, Tu-Cheng (TW)

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

(21) Appl. No.: **14/543,266**

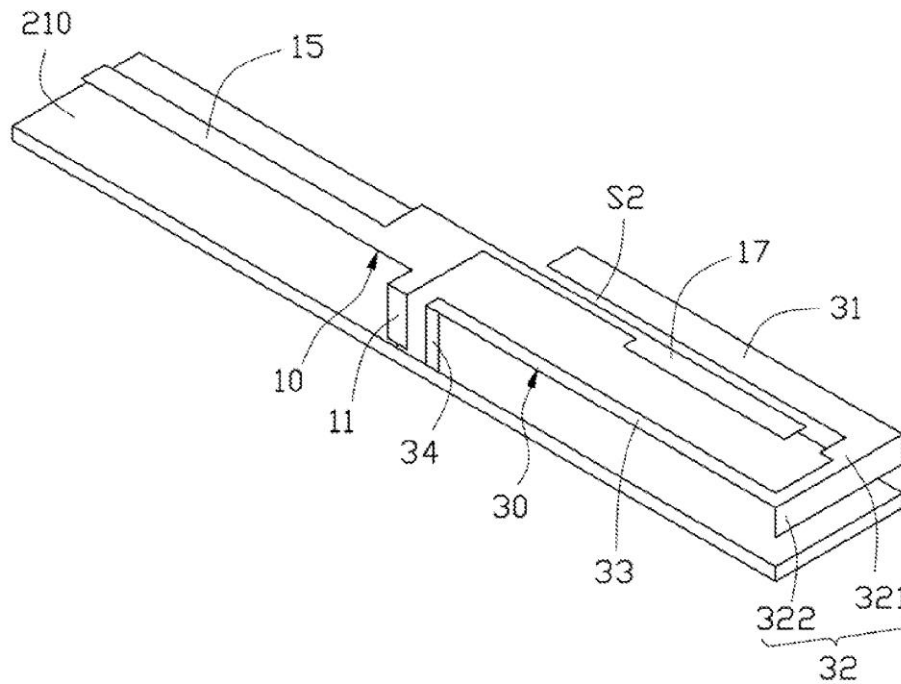
(57) **ABSTRACT**

(22) Filed: **Nov. 17, 2014**

An antenna structure includes a main body, a first radiating body, and a second radiating body. The main body includes a feeding portion, a connecting portion, a first coupling portion, and a second coupling portion. The connecting portion is perpendicularly connected to the feeding portion. The first coupling portion and the second coupling portion are positioned at two opposite sides of the connecting portion. The first radiating body is configured to surround and resonate with the first coupling portion. The second radiating body is configured to surround and resonate with the second coupling portion.

(30) **Foreign Application Priority Data**

Nov. 30, 2013 (CN) 201310622289.6





US 20150155633A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0155633 A1**
(43) **Pub. Date: Jun. 4, 2015**

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

Publication Classification

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

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

(72) Inventors: **Yi-Chieh LEE**, New Taipei (TW);
Yen-Hui LIN, Tu-Cheng (TW)

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

(21) Appl. No.: **14/555,534**

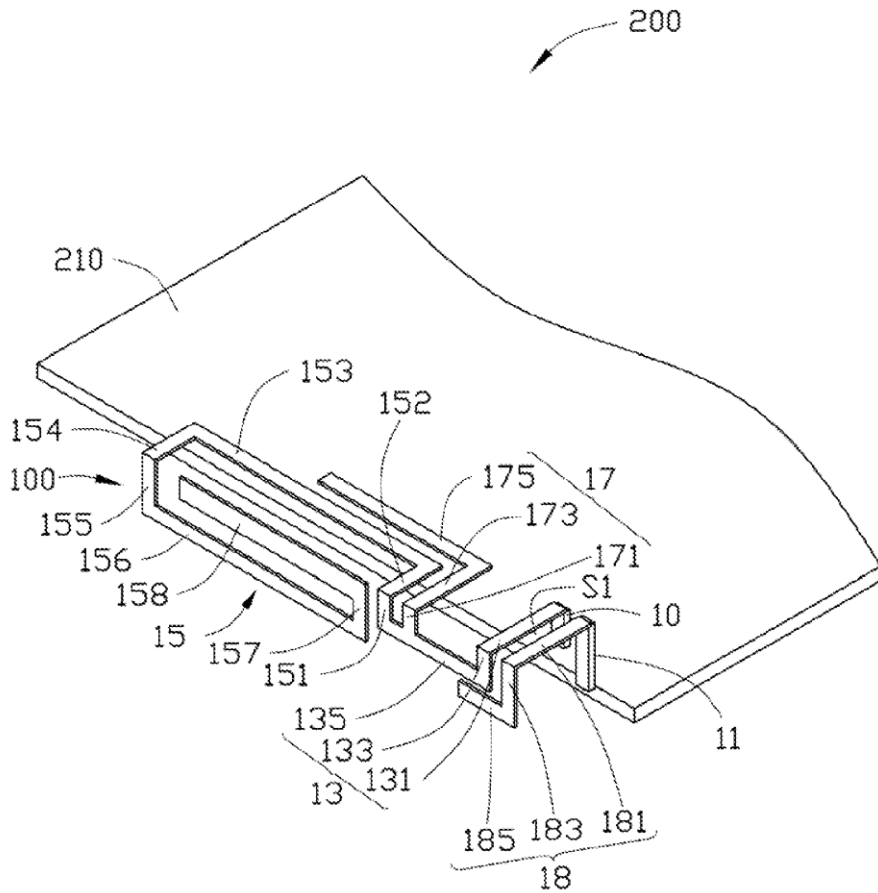
(57) **ABSTRACT**

(22) Filed: **Nov. 26, 2014**

An antenna structure includes a feed portion, a ground portion, a connecting portion, a first radiating portion, a second radiating portion, and a resonance portion. The ground portion is spaced apart from the feed portion. The connecting portion is electrically connected to the feed portion. The first radiating portion and the second radiating portion are both electrically connected to the connecting portion. The resonance portion is electrically connected to the ground portion. The connecting portion and the resonance portion define a slot therebetween.

(30) **Foreign Application Priority Data**

Nov. 30, 2013 (CN) 201310622350.7





US 20150155634A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0155634 A1**

(43) **Pub. Date: Jun. 4, 2015**

(54) **ANTENNA ARRANGEMENT AND DEVICE**

Publication Classification

(71) Applicants: **Erik Lennart Bengtsson**, Eslov (SE);
Ying Zhinong, Lund (SE)

(51) **Int. Cl.**
H01Q 9/04 (2006.01)
H01Q 19/00 (2006.01)

(72) Inventors: **Erik Lennart Bengtsson**, Eslov (SE);
Ying Zhinong, Lund (SE)

(52) **U.S. Cl.**
CPC **H01Q 9/0442** (2013.01); **H01Q 19/005**
(2013.01)

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

(57) **ABSTRACT**

(21) Appl. No.: **14/360,091**

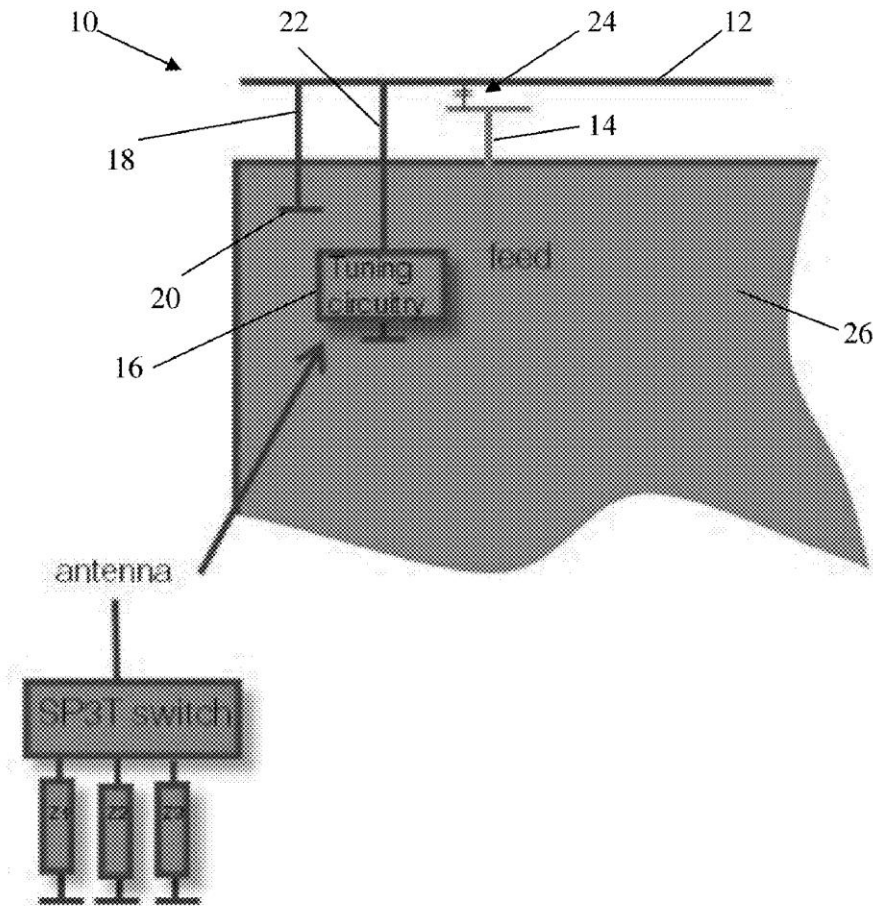
(22) PCT Filed: **Jun. 20, 2013**

(86) PCT No.: **PCT/IB2013/001290**

§ 371 (c)(1),

(2) Date: **May 22, 2014**

Antenna arrangement (10) comprising at least one parasitic element (12), a feed element (14), and at least one-tuning circuitry (16). The at least one-parasitic element (12) comprises a first connection (18) connected to ground (20), and a second connection (22) connected to said at least one-tuning circuitry (16), and is galvanically separated from said feed element (14) and electromagnetically coupled to said feed element (14).





US 20150162659A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0162659 A1**

(43) **Pub. Date: Jun. 11, 2015**

(54) **COMMUNICATION DEVICE AND ANTENNA ELEMENT THEREIN**

Publication Classification

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

(51) **Int. Cl.**
H01Q 5/371 (2006.01)

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

(52) **U.S. Cl.**
CPC **H01Q 5/371** (2015.01)

(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 is disposed adjacent to an edge of the ground element. The antenna element includes a loop metal element and a branch metal element. The loop metal element has a first end and a second end. The first end is coupled to a signal source. The second end is coupled to the ground element. The loop metal element includes a first segment and a second segment. The first segment is separated from the second segment by a gap. The first segment includes the first end, and the second segment includes the second end. The branch metal element has a third end and a fourth end. The third end is coupled through an inductive element to a connection point on the loop metal element. The fourth end is open.

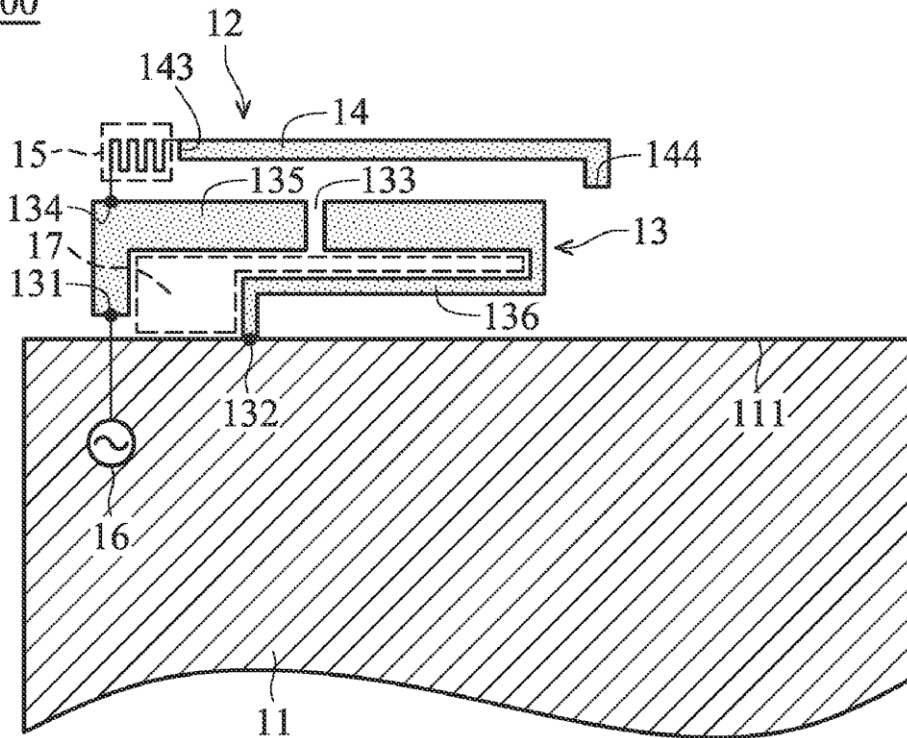
(21) Appl. No.: **14/205,763**

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

(30) **Foreign Application Priority Data**

Dec. 11, 2013 (TW) 102145503

100





US 20150162662A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0162662 A1**

(43) **Pub. Date: Jun. 11, 2015**

(54) **METHOD AND APPARATUS FOR CONTROLLING AN ANTENNA**

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

CPC *H01Q 9/0442* (2013.01)

(71) Applicant: **Skycross, Inc.**, San Jose, CA (US)

(72) Inventors: **Li Chen**, Melbourne, FL (US); **Frank M. Caimi**, Vero Beach, FL (US); **Mark T. Montgomery**, Melbourne Beach, FL (US); **Paul A. Tornatta, JR.**, Melbourne, FL (US)

(57)

ABSTRACT

A system that incorporates the subject disclosure may include, for example, a method for coupling a primary antenna to an auxiliary antenna portion with a current-controlled switch. The method further includes generating a unidirectional direct current or a first bias voltage having a first polarity to cause the current-controlled switch to substantially form a conduction channel between the primary antenna and the auxiliary antenna portion. While the conduction channel is present, a first resonance frequency range of the primary antenna is frequency shifted to a second resonance frequency range. The method can also include removing the unidirectional direct current or generating a second bias voltage having a second polarity to cause the current-controlled switch to form an open circuit between the primary antenna and the auxiliary antenna portion. While the open circuit is present, the first resonance frequency range of the primary antenna is restored. Other embodiments are disclosed.

(21) Appl. No.: **14/574,752**

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

Related U.S. Application Data

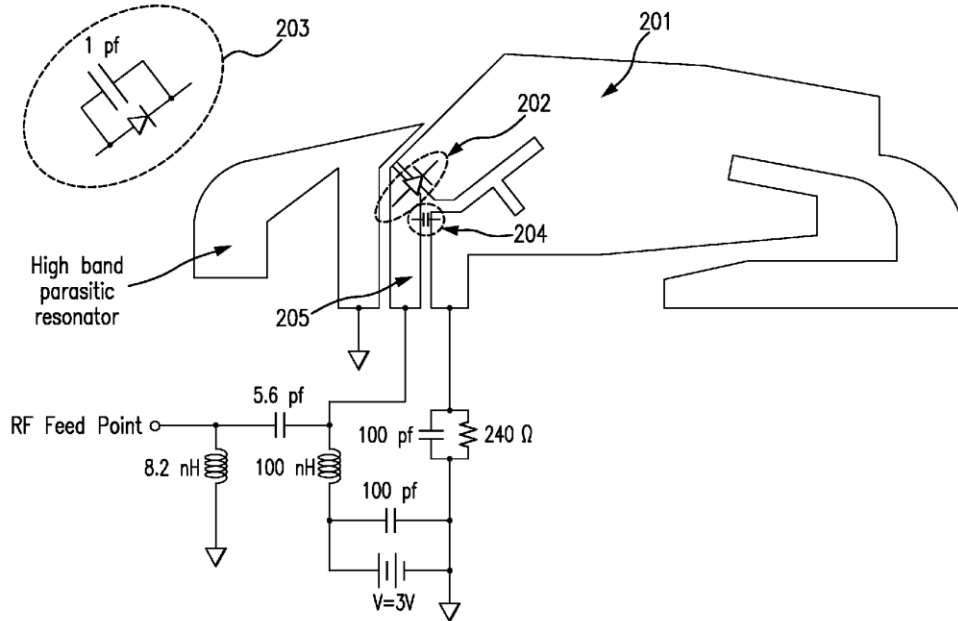
(63) Continuation of application No. 13/768,834, filed on Feb. 15, 2013, now Pat. No. 8,947,308.

(60) Provisional application No. 61/600,240, filed on Feb. 17, 2012.

Publication Classification

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

(2006.01)





US 20150162664A1

(19) **United States**

(12) **Patent Application Publication**
Kawata

(10) **Pub. No.: US 2015/0162664 A1**

(43) **Pub. Date: Jun. 11, 2015**

(54) **ANTENNA**

Publication Classification

(71) Applicant: **Yamaha Corporation**, Hamamatsu-shi,
Shizuoka (JP)

(51) **Int. Cl.**
H01Q 9/26 (2006.01)

H01Q 9/06 (2006.01)

(72) Inventor: **Akihiro Kawata**, Nukata-gun (JP)

(52) **U.S. Cl.**
CPC . **H01Q 9/26** (2013.01); **H01Q 9/065** (2013.01)

(21) Appl. No.: **14/407,315**

(57) **ABSTRACT**

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

(86) PCT No.: **PCT/JP2013/066499**

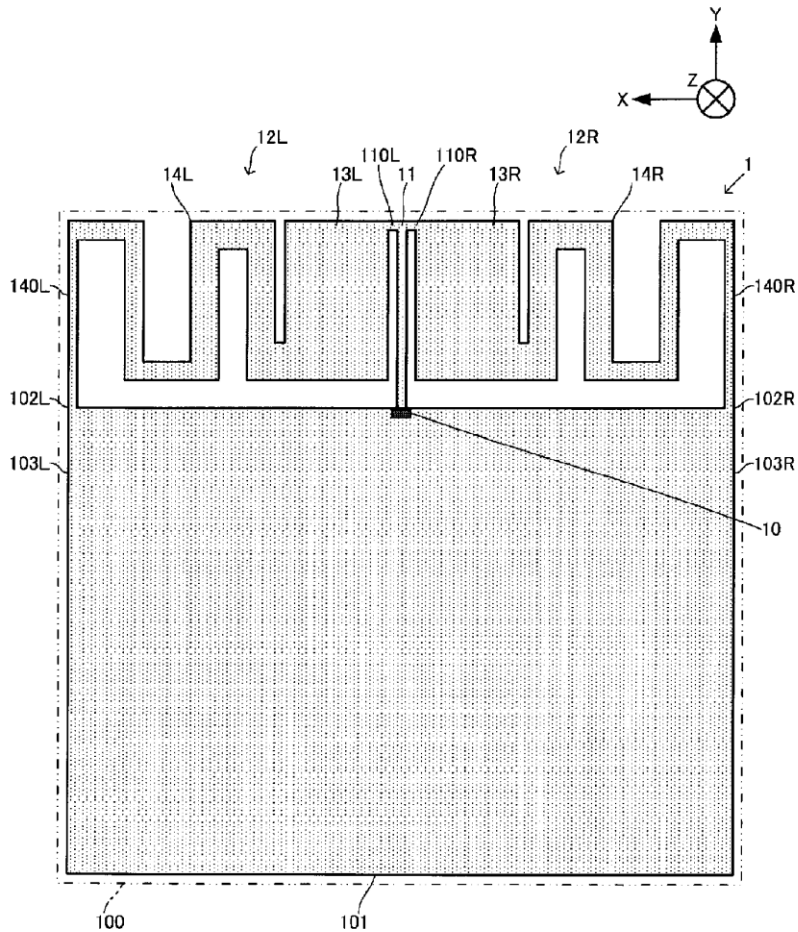
§ 371 (c)(1),

(2) Date: **Dec. 11, 2014**

An antenna has the following formed on a plane thereof: a vertical element formed in a vertical direction; a left horizontal element formed on a left side of the vertical element; a right horizontal element formed on a right side of the vertical element; a left short stub that connects the left horizontal element and a left upper corner of a ground pattern; and a right short stub that connects the right horizontal element and a right upper corner of the ground pattern. The right and left horizontal elements have a flat plate shape and a capacity hat.

(30) **Foreign Application Priority Data**

Jun. 14, 2012 (JP) 2012-134795
Feb. 12, 2013 (JP) 2013-024551





US 20150171503A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0171503 A1**

(43) **Pub. Date: Jun. 18, 2015**

(54) **ELECTRONIC DEVICE**

Publication Classification

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

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

(72) Inventors: **Chun-Hsiang LEI**, New Taipei City (TW); **Yuan-Cheng SUN**, New Taipei City (TW); **Chien-Ju CHEN**, New Taipei City (TW); **Po-Hsien CHU**, New Taipei City (TW)

H01Q 1/24 (2006.01)

(52) **U.S. Cl.**
CPC **H01Q 1/2266** (2013.01); **H01Q 1/243** (2013.01)

(21) Appl. No.: **14/449,287**

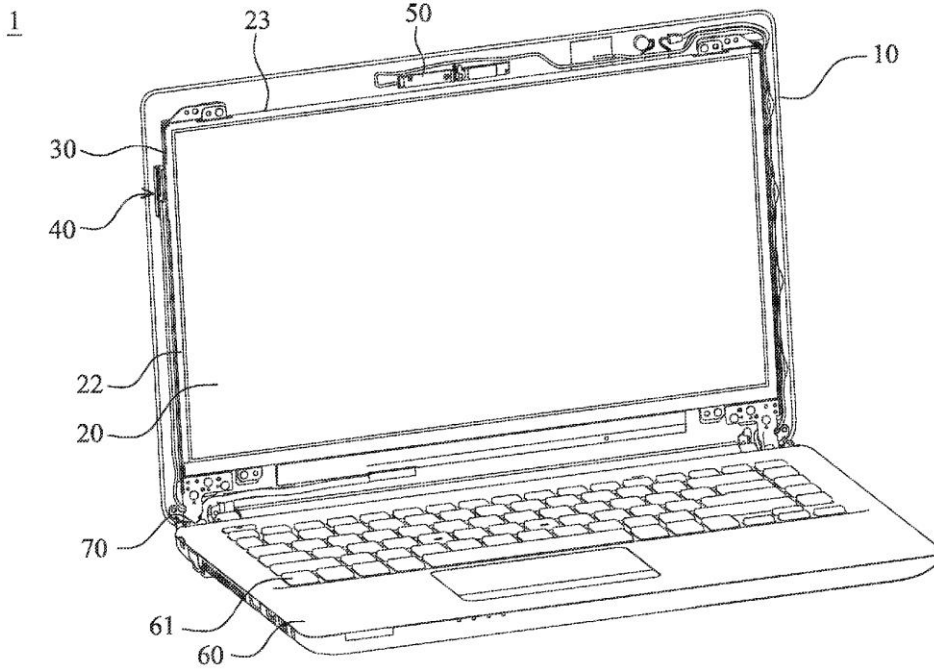
(57) **ABSTRACT**

(22) Filed: **Aug. 1, 2014**

An electronic device is provided. The electronic device includes a housing, a display, a supporting frame and an antenna. The display is disposed in the housing. The supporting frame supports the display. The antenna includes a radiator and a connection section. The connection section is connected to the radiator, wherein the connection section is coupled to the supporting frame.

(30) **Foreign Application Priority Data**

Dec. 18, 2013 (TW) 102146837





US 20150171504A1

(19) **United States**

(12) **Patent Application Publication**
Hotta

(10) **Pub. No.: US 2015/0171504 A1**

(43) **Pub. Date: Jun. 18, 2015**

(54) **ELECTRONIC APPARATUS**

Publication Classification

(71) Applicant: **Kabushiki Kaisha Toshiba**, Tokyo (JP)

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

(72) Inventor: **Hiroyuki Hotta**, Ome-shi (JP)

(52) **U.S. Cl.**
CPC **H01Q 1/2266** (2013.01)

(21) Appl. No.: **14/460,153**

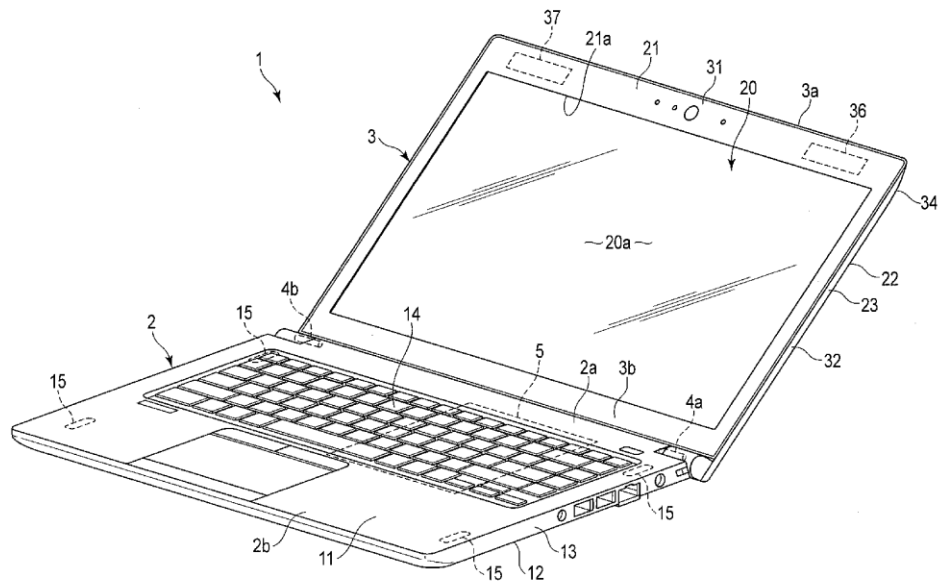
(22) Filed: **Aug. 14, 2014**

(57) **ABSTRACT**

Related U.S. Application Data

(60) Provisional application No. 61/915,978, filed on Dec. 13, 2013.

According to one embodiment, an electronic apparatus includes a housing, an electronic component in the housing, and an antenna in the housing. The antenna includes a feed point, and an antenna element pattern located between the feed point and the electronic component.





US 20150171507A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0171507 A1**

(43) **Pub. Date: Jun. 18, 2015**

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

Publication Classification

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

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

(72) Inventors: **TZE-HSUAN CHANG**, New Taipei (TW); **CHO-KANG HSU**, New Taipei (TW)

(52) **U.S. Cl.**
CPC . **H01Q 1/243** (2013.01); **H01Q 7/00** (2013.01)

(21) Appl. No.: **14/554,818**

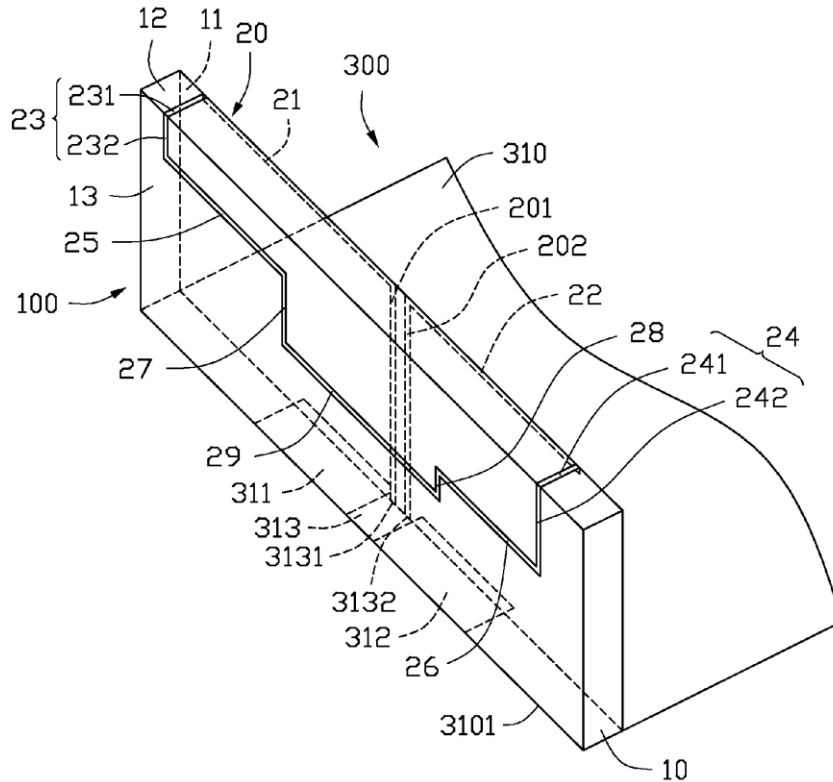
(57) **ABSTRACT**

(22) Filed: **Nov. 26, 2014**

An antenna structure includes an antenna holder, a feed portion, a grounding portion, and a radiating body. The antenna holder includes a plurality of surfaces. The feed portion and the ground portion are both positioned on one surface of the antenna holder. The radiating body is positioned on at least one surface of the antenna holder. The feed portion is electronically connected to a first end of the radiating body. The ground portion is electronically connected to a second end of the radiating body so as to form a loop antenna.

(30) **Foreign Application Priority Data**

Dec. 18, 2013 (CN) 201310696297.5





US 20150171508A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0171508 A1**

(43) **Pub. Date: Jun. 18, 2015**

(54) **ANTENNA DEVICE, AND COMMUNICATION
DEVICE WITH ANTENNA DEVICE**

Publication Classification

(71) Applicant: **Samsung Electronics Co., Ltd.**,
Suwon-si (KR)

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 5/307 (2006.01)
H01Q 9/04 (2006.01)

(72) Inventors: **Jong-Hyeok JEON**, Seoul (KR);
Hun-Cheol OH, Seoul (KR)

(52) **U.S. Cl.**
CPC *H01Q 1/243* (2013.01); *H01Q 9/0407*
(2013.01); *H01Q 5/307* (2015.01)

(21) Appl. No.: **14/570,453**

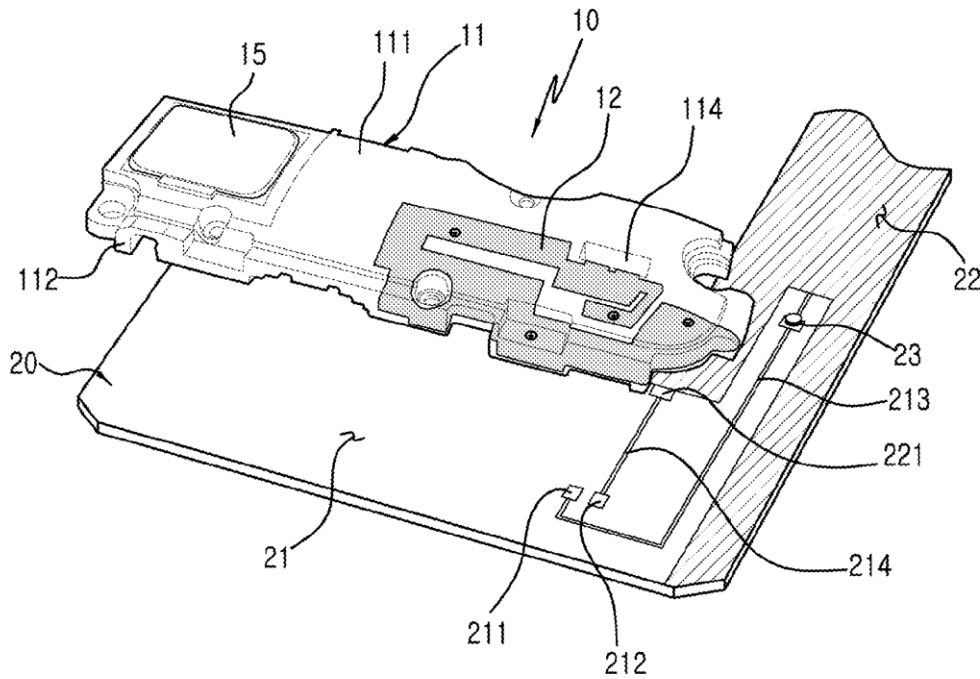
(57) **ABSTRACT**

(22) Filed: **Dec. 15, 2014**

An antenna device and a communication device with the antenna device are provided. The antenna device includes a first radiator located on a first layer, and a second radiator located on a second layer spatially separated from the first layer in the Z-axis direction, and electromagnetically coupled to the first radiator in the Z-axis direction. The first radiator and the second radiator are each electrically connected to a ground surface.

(30) **Foreign Application Priority Data**

Dec. 16, 2013 (KR) 10-2013-0156346





US 20150171518A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0171518 A1**

(43) **Pub. Date: Jun. 18, 2015**

(54) **MULTI-BAND ANTENNA**

Publication Classification

(71) Applicant: **Amazon Technologies, Inc.**, Reno, NV (US)

(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 5/01 (2006.01)

(72) Inventors: **Cheng-Jung Lee**, San Jose, CA (US);
Tao Zhou, San Jose, CA (US)

(52) **U.S. Cl.**
CPC . **H01Q 5/001** (2013.01); **H01Q 5/01** (2013.01)

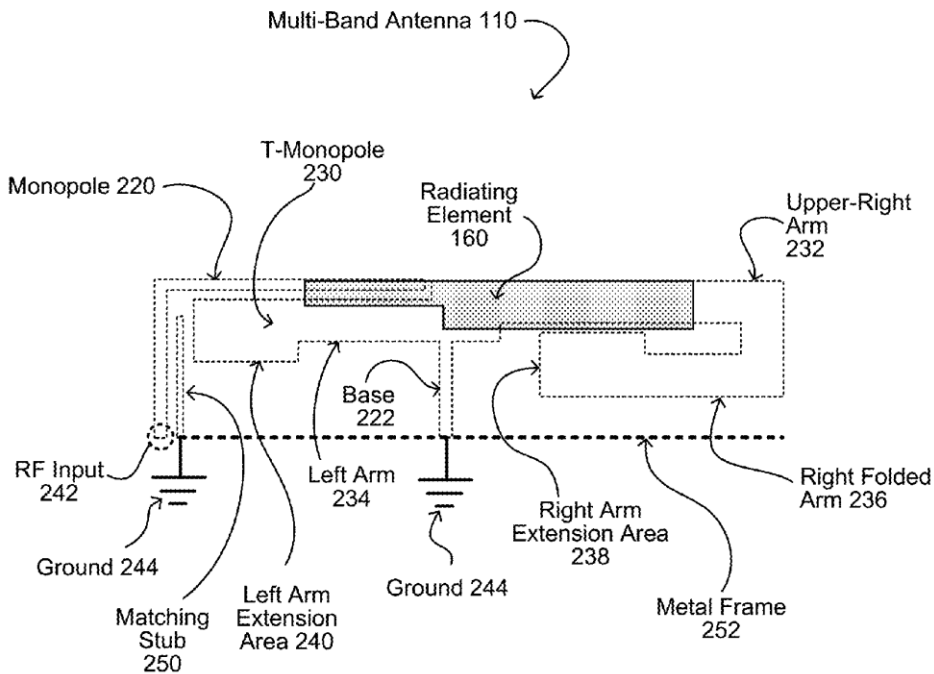
(73) Assignee: **Amazon Technologies, Inc.**, Reno, NV (US)

(57) **ABSTRACT**

A multiband antenna for mobile devices that includes both energized and parasitically-coupled resonant elements. An energized element is fed radio frequency energy and resonates at a first frequency. A first parasitic element, arranged on a same surface as the energized element, is parasitically coupled to the energized element and resonates with at least a second frequency. A second parasitic element, arranged on a surface opposite the energized element resonates at a third frequency.

(21) Appl. No.: **14/108,564**

(22) Filed: **Dec. 17, 2013**





US 20150171911A1

(19) **United States**

(12) **Patent Application Publication**
Yang

(10) **Pub. No.: US 2015/0171911 A1**

(43) **Pub. Date: Jun. 18, 2015**

(54) **MOBILE COMMUNICATION DEVICE**

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

CPC *H04B 1/3838* (2013.01); *H04B 1/16* (2013.01)

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

(57)

ABSTRACT

(72) Inventor: **Chung-Wen Yang**, New Taipei City (TW)

A mobile communication device including an antenna element, a low-frequency blocking element, a first isolation circuit, a second isolation circuit and a high-frequency blocking element is provided. The antenna element converts a radio-frequency signal into an electromagnetic wave and generates a sensing signal in response to a proximity of an object. The antenna element includes a radiation portion and a parasitic portion which are spaced by a coupling gap. The low-frequency blocking element transmits the radio-frequency signal to the radiation portion. The first isolation circuit and a connection element are connected in series between the radiation portion and the parasitic portion, and the first isolation circuit blocks the radio-frequency signal. The second isolation circuit is electrically connected between the parasitic portion and a ground plane, and blocks the sensing signal. The high-frequency blocking element transmits the sensing signal from the antenna element to a sensing controller through a metal line.

(21) Appl. No.: **14/571,309**

(22) Filed: **Dec. 16, 2014**

(30) **Foreign Application Priority Data**

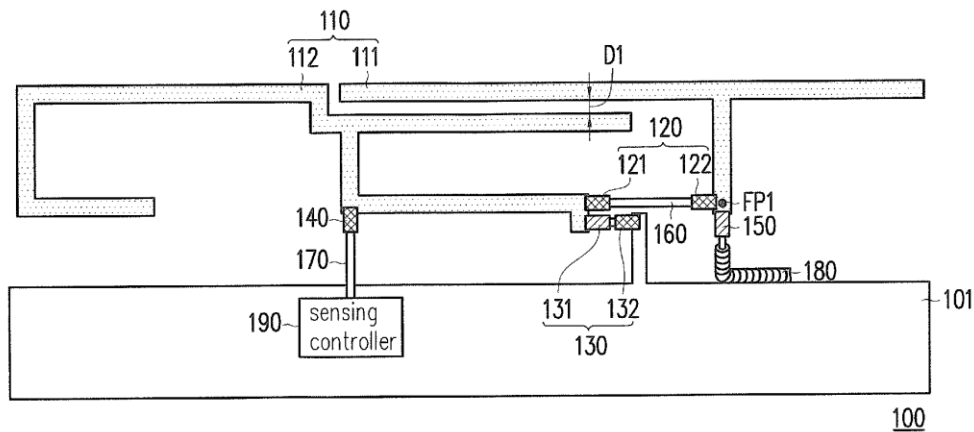
Dec. 18, 2013 (TW) 102146904

Publication Classification

(51) **Int. Cl.**

H04B 1/3827 (2006.01)

H04B 1/16 (2006.01)





US 20150171916A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0171916 A1**

(43) **Pub. Date: Jun. 18, 2015**

(54) **MOBILE DEVICE WITH ANTENNA AND CAPACITANCE SENSING SYSTEM WITH SLOTTED METAL BEZEL**

Publication Classification

(51) **Int. Cl.**
H04B 1/68 (2006.01)
H01Q 1/24 (2006.01)
(52) **U.S. Cl.**
CPC . *H04B 1/68* (2013.01); *H01Q 1/243* (2013.01)

(71) Applicant: **MOTOROLA MOBILITY LLC**,
Chicago, IL (US)
(72) Inventors: **Vijay L. Asrani**, Round Lake, IL (US);
Khan Mohammed Shams, Lindenhurst,
IL (US); **Timothy J. Sutherland**,
Gurnee, IL (US)

(57) **ABSTRACT**

A mobile communication device is provided having a peripheral metal bezel made up of a plurality of metal segments. At least one of the metal segments on the bezel is configured to be a main antenna that is connected to a transceiver circuit via an antenna matching circuit. Proximate to the main antenna is another metal segment on the metal bezel that is configured to be a capacitance proximity sensor. The capacitance proximity sensor, in conjunction with a capacitance sensing circuit provide information to the circuitry within the mobile communication device to tune the antenna matching circuit to impedance match the transceiver with the antenna.

(73) Assignee: **MOTOROLA MOBILITY LLC**,
Chicago, IL (US)

(21) Appl. No.: **14/293,013**

(22) Filed: **Jun. 2, 2014**

Related U.S. Application Data

(60) Provisional application No. 61/915,554, filed on Dec. 13, 2013.

