US 20120212377A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0212377 A1

(43) Pub. Date: Aug. 23, 2012

HE et al.

(54) **MOBILE BROADBAND DEVICE**

(75) Inventors: **Jinjun HE**, Shenzhen (CN); **Bin Zhang**, Shenzhen (CN); **Yaming Jiang**, Wuhan (CN)

(73) Assignee: **HUAWEI DEVICE CO., LTD.**, Shenzhen (CN)

(21) Appl. No.: **13/455,262**

(22) Filed: **Apr. 25, 2012**

Related U.S. Application Data

(63) Continuation of application No. PCT/CN2010/078100, filed on Oct. 26, 2010.

(30) **Foreign Application Priority Data**

Oct. 26, 2009 (CN) 200920246276.2

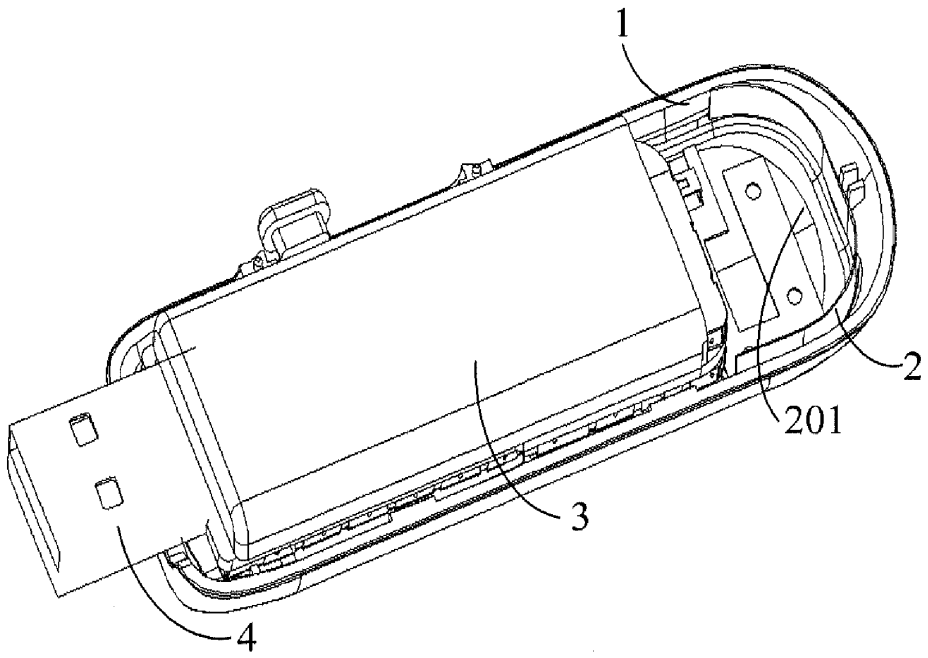
Publication Classification

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

(52) **U.S. Cl.** **343/702**

(57) **ABSTRACT**

The present invention provides a mobile broadband device, and relates to the field of communications technologies. The mobile broadband device includes a casing, a Printed Circuit Board Assembly (PCBA), and an antenna. The antenna and the PCBA are both set in the casing, and the PCBA can be slidably pulled out or retracted back along the casing. The antenna is fixedly set on an inner side of the casing and forms a hollow space for accommodating the retracted PCBA, there is a contact point set on the antenna, and the contact point is electrically connected to a feed point of the PCBA. With the mobile broadband device, the antenna does not individually occupy part of space in the casing without affecting the performance of the antenna; therefore, the volume and length of the mobile broadband device are effectively reduced, and the portability of the mobile broadband device is effectively improved.



US 20120212378A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0212378 A1

(43) Pub. Date: Aug. 23, 2012

SUNG et al.

(54) ANTENNA DEVICE OF MOBILE TERMINAL

(75) Inventors: **Sang Bong SUNG**, Gumi-si (KR); **In Jin HWANG**, Gumi-si (KR); **Seung Hwan KIM**, Suwon-si (KR); **Jae Ho LEE**, Yongin-si (KR)

(73) Assignee: **Samsung Electronics Co., Ltd.**, Suwon-si (KR)

(21) Appl. No.: **13/458,453**

(22) Filed: **Apr. 27, 2012**

Related U.S. Application Data

(63) Continuation of application No. 12/489,044, filed on Jun. 22, 2009, now Pat. No. 8,188,930.

(30) **Foreign Application Priority Data**

Jun. 20, 2008 (KR) 10-2008-0058619

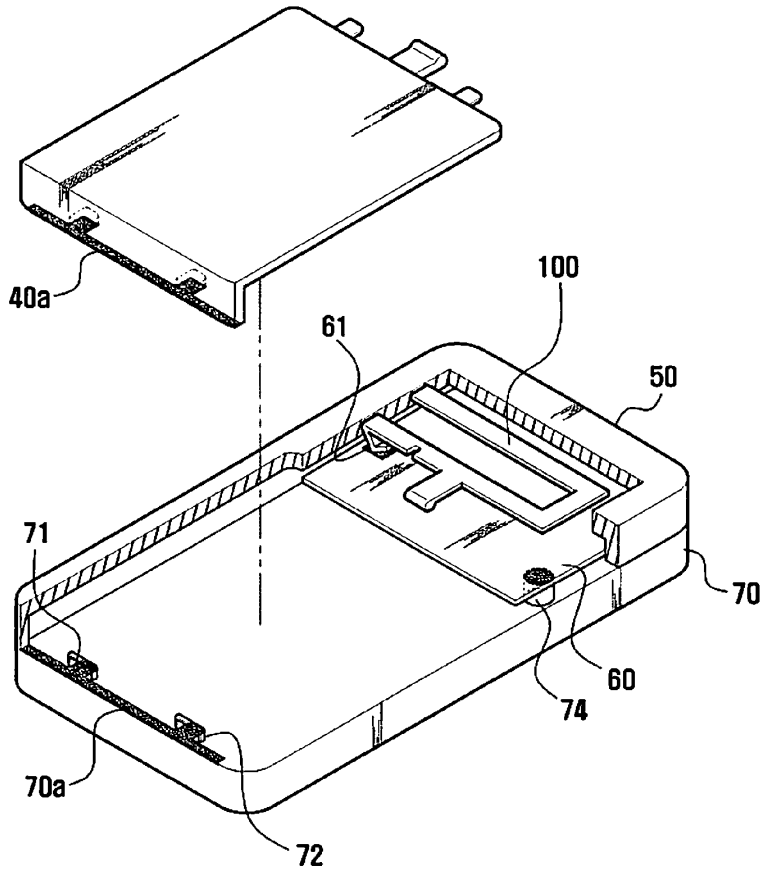
Publication Classification

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

(52) **U.S. Cl.** **343/702**

(57) **ABSTRACT**

An antenna device of a mobile terminal that can secure radiation performance is provided. The antenna device having a battery cover composed of a metal material includes a radiation unit for transmitting and receiving a signal, a feeding unit formed at an end portion of a first side of the radiation unit for electrically connecting the radiation unit to a Printed Circuit Board (PCB), and a ground part disposed a predetermined distance from the feeding unit and formed at a second side of the radiation unit. When the battery cover is fastened to the mobile terminal, the ground part contacts a first side of the battery cover.



US 20120212389A1

(19) **United States**

(12) **Patent Application Publication**

AIZAWA et al.

(10) **Pub. No.: US 2012/0212389 A1**

(43) **Pub. Date: Aug. 23, 2012**

(54) **MULTIANTENNA UNIT AND COMMUNICATION APPARATUS**

(75) Inventors: **Daisuke AIZAWA**, Daito-shi (JP); **Naoyuki Wakabayashi**, Daito-shi (JP)

(73) Assignee: **Funai Electric Co, Ltd.**, Daito-shi (JP)

(21) Appl. No.: **13/397,762**

(22) Filed: **Feb. 16, 2012**

(30) **Foreign Application Priority Data**

Feb. 21, 2011 (JP) 2011-34206
Mar. 22, 2011 (JP) 2011-62960

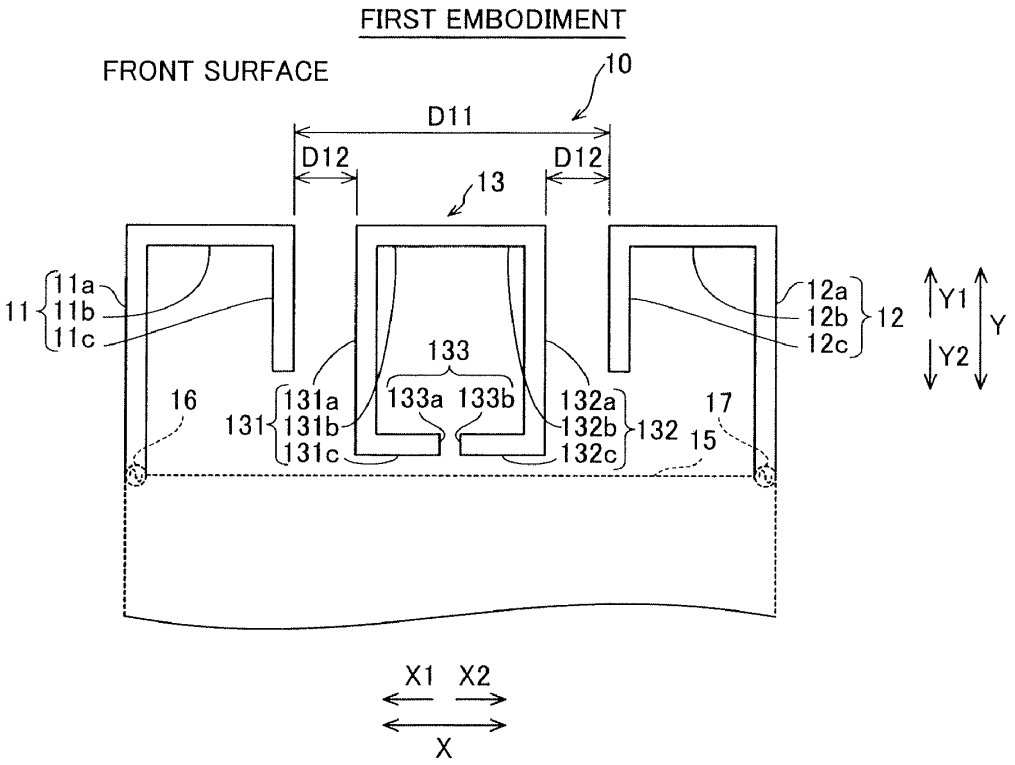
Publication Classification

(51) **Int. Cl.**
H01Q 21/00 (2006.01)
H01Q 1/50 (2006.01)

(52) **U.S. Cl.** **343/853**; 343/893

(57) **ABSTRACT**

This multiantenna unit includes a first antenna element, a second antenna element and a non-grounded passive element arranged between the first and second antenna elements. The passive element includes a first portion arranged on a front surface of a substrate and an extensional portion, connected to the first portion, extending perpendicularly to the front surface of the substrate.



US 20120212390A1

(19) **United States**

(12) **Patent Application Publication**

Lan

(10) **Pub. No.: US 2012/0212390 A1**

(43) **Pub. Date: Aug. 23, 2012**

(54) **METHOD FOR IMPLEMENTING WIRELESS EQUIPMENT ANTENNA AND WIRELESS EQUIPMENT**

(75) Inventor: **Yao Lan**, Shenzhen (CN)

(73) Assignee: **Huawei Device Co., Ltd.**, Shenzhen (CN)

(21) Appl. No.: **13/459,737**

(22) Filed: **Apr. 30, 2012**

Related U.S. Application Data

(63) Continuation of application No. PCT/CN2010/075851, filed on Aug. 10, 2010.

(30) **Foreign Application Priority Data**

Oct. 30, 2009 (CN) 200910207792.9

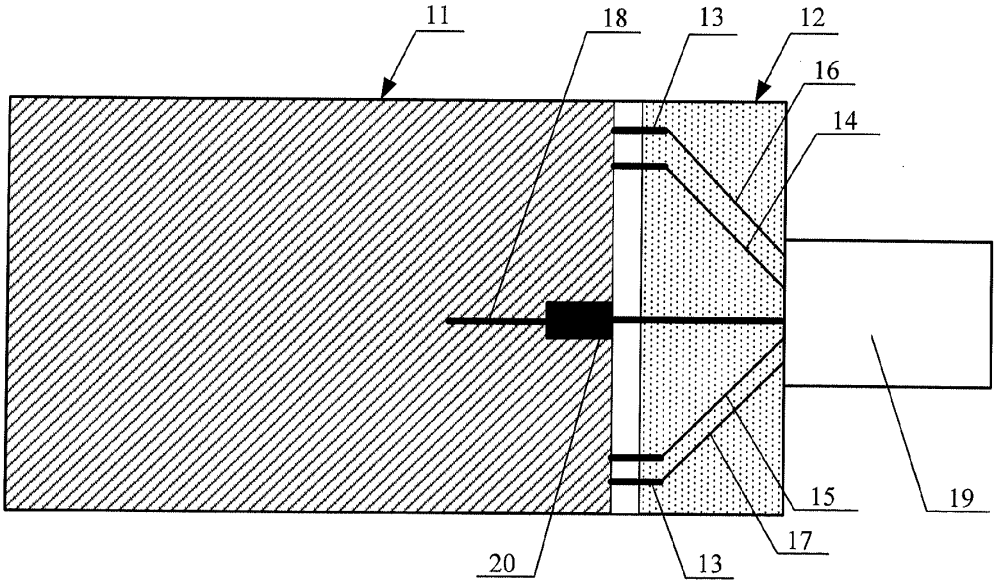
Publication Classification

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

(52) **U.S. Cl.** **343/860**

(57) **ABSTRACT**

A method for implementing a wireless equipment antenna and wireless equipment are provided. The method includes: dividing the wireless equipment into a first part and a second part, and electrically connecting the two parts only through a radio frequency signal feed line and a frequency selection network component; the first part at least includes a radio frequency chip, the second part includes a connection component for connecting network equipment, and the part which is on the wireless equipment and shares the metal ground with the network equipment after connecting the network equipment except the radio frequency signal feed line and the frequency selection network component; applying the frequency selection network component to correspondingly connect the power line and data line respectively on the second part and the first part; using the second part as the antenna of the wireless equipment.



US 20120214424A1

(19) **United States**

(12) **Patent Application Publication**

Yeh et al.

(10) **Pub. No.: US 2012/0214424 A1**

(43) **Pub. Date: Aug. 23, 2012**

(54) **SINGLE INPUT/MULTIPLE OUTPUT (SIMO) OR MULTIPLE INPUT/SINGLE OUTPUT (MISO) OR MULTIPLE INPUT/MULTIPLE OUTPUT (MIMO) ANTENNA MODULE**

(75) Inventors: **Ming-Hao Yeh**, Taipei City 111 (TW); **Kuo-Fong Hung**, Changhua City (TW)

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

(21) Appl. No.: **13/032,713**

(22) Filed: **Feb. 23, 2011**

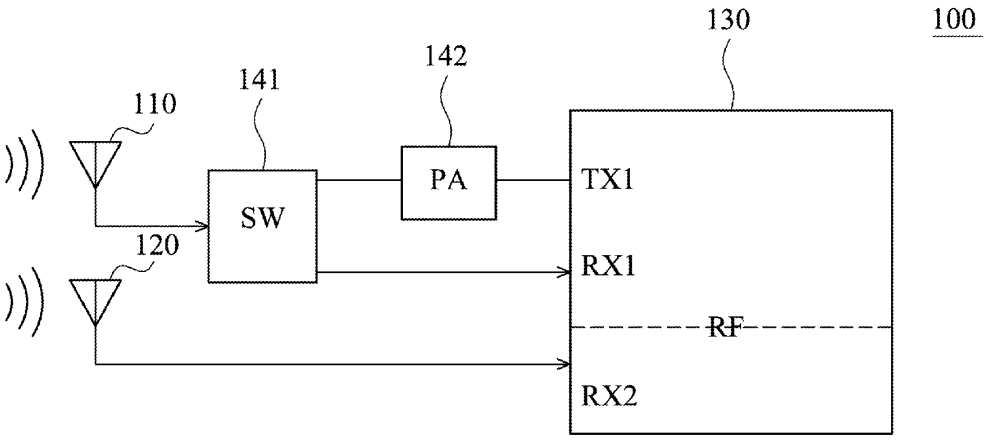
Publication Classification

(51) **Int. Cl.**
H01Q 13/16 (2006.01)

(52) **U.S. Cl.** **455/73**

(57) **ABSTRACT**

An antenna module is provided. The antenna module includes a first slot antenna unit and a second slot antenna unit. The first slot antenna unit is coupled to a radio frequency (RF) unit. The second slot antenna unit is coupled to the RF unit. The first and second slot antenna units are embedded in a wireless communications dongle, and the wireless communications dongle operates as a modem to transmit or receive a wireless signal to or from a wireless telephony communications network for a computer via the first and second slot antenna units when the wireless communication dongle connects to the computer.



US 20120218151A1

(19) **United States**

(12) **Patent Application Publication**

Wong et al.

(10) **Pub. No.: US 2012/0218151 A1**

(43) **Pub. Date: Aug. 30, 2012**

(54) **MOBILE COMMUNICATION DEVICE AND ANTENNA STRUCTURE THEREIN**

(76) Inventors: **Kin-Lu Wong**, New Taipei City (TW); **Shu-Chuan Chen**, New Taipei City (TW)

(21) Appl. No.: **13/109,994**

(22) Filed: **May 17, 2011**

(30) **Foreign Application Priority Data**

Feb. 25, 2011 (TW) 100106389

Publication Classification

(51) **Int. Cl.**

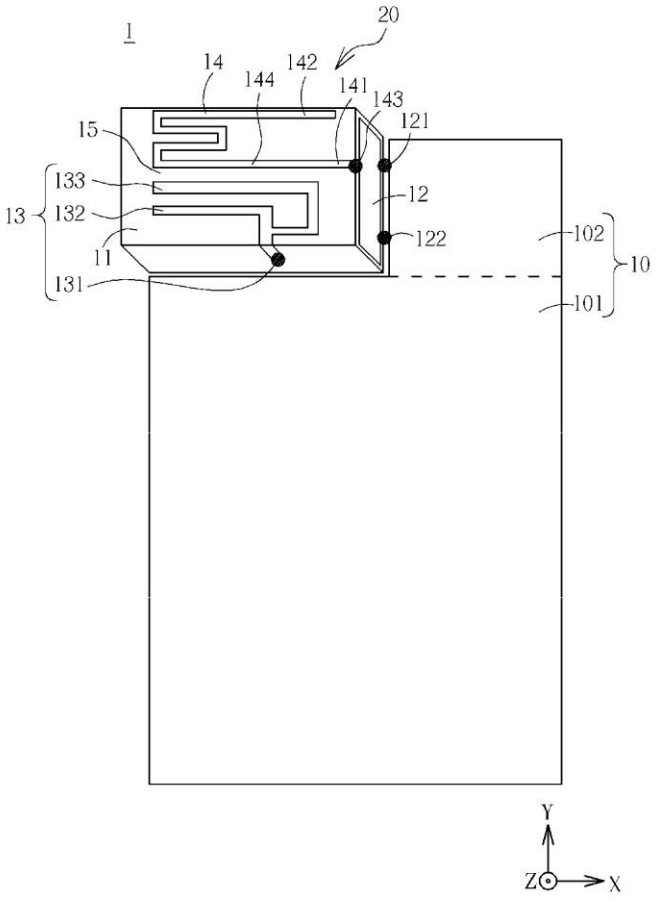
H01Q 5/00 (2006.01)

H01Q 9/04 (2006.01)

(52) **U.S. Cl.** ..... **343/700 MS**

(57) **ABSTRACT**

A mobile communication device having an antenna structure includes a grounding element and an antenna element. The antenna element includes an antenna ground plane, a radiation portion, and a shorted radiation portion, wherein the antenna ground plane is grounded to the grounding element. The radiation portion includes a signal feeding point, a first radiation section, and a second radiation section. First and second radiation sections are connected to the signal feeding point, and are extended toward the same direction. First end of the shorted radiation portion is electrically connected to the antenna ground plane, and second end is left open. There is a coupling gap between a designated section of the radiation portion close to the first end and the shorted radiation portion. Through the coupling gap, the shorted radiation portion is capacitively excited by the radiation portion and generates at least one resonant mode to increase antenna's operating bandwidth.



US 20120218157A1

(19) **United States**

(12) **Patent Application Publication**

ENDOU et al.

(10) **Pub. No.: US 2012/0218157 A1**

(43) **Pub. Date: Aug. 30, 2012**

(54) **ANTENNA DEVICE**

(75) Inventors: **Kenji ENDOU**, Tokyo (JP); **Yasuyuki Hara**, Tokyo (JP)

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

(21) Appl. No.: **13/402,208**

(22) Filed: **Feb. 22, 2012**

(30) **Foreign Application Priority Data**

Feb. 28, 2011 (JP) 2011-043029
Aug. 10, 2011 (JP) 2011-174458

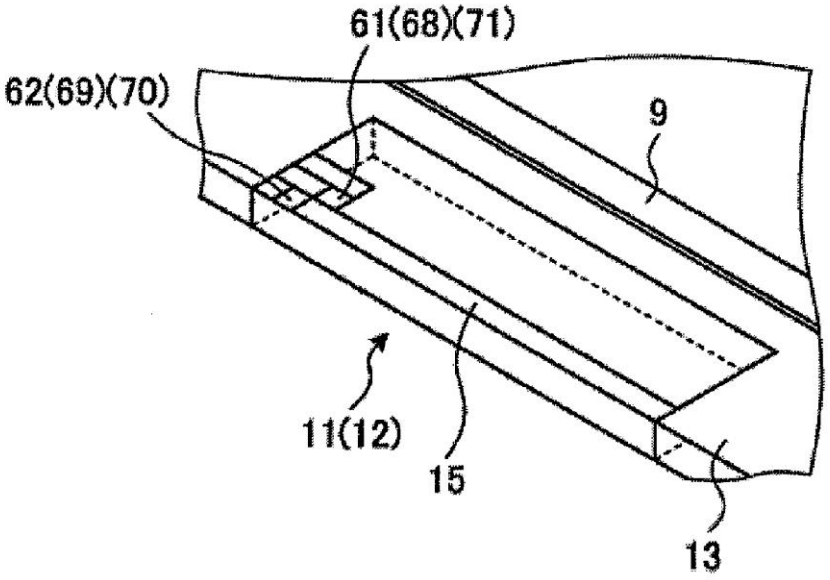
Publication Classification

(51) **Int. Cl.**
H01Q 11/12 (2006.01)

(52) **U.S. Cl.** **343/741**

(57) **ABSTRACT**

An antenna device includes a loop-shaped element radiating a radio wave of at least wavelength λ and having an electrical length of m×λ; a first power feeder exciting the loop-shaped element via voltage or current coupling by using a first electrical signal for radiating the radio wave; and a second power feeder exciting the loop-shaped element via a coupling method that is the same type as the first power feeder by using a second electrical signal for radiating a radio wave of wavelength λ/(2×p−1) at a portion that becomes a node of a standing wave that is formed with the first power feeder as an anti-node and that is based on the first electrical signal, here, "m" and "p" are natural numbers.



US 20120218162A1

(19) **United States**

(12) **Patent Application Publication**

Aoki et al.

(10) **Pub. No.: US 2012/0218162 A1**

(43) **Pub. Date: Aug. 30, 2012**

(54) **MULTIFREQUENCY ANTENNA**

(75) Inventors: **Yutaka Aoki**, Ome-shi (JP); **Shigeru Yagi**, Nerima-ku (JP); **Akira Saitou**, Machida-shi (JP); **Kazuhiko Honjo**, Tsukuba-shi (JP)

(73) Assignees: **The University fo Electro-Communications**, Tokyo (JP); **Casio Computer Co., Ltd.**, Tokyo (JP)

(21) Appl. No.: **13/505,041**

(22) PCT Filed: **Feb. 22, 2011**

(86) PCT No.: **PCT/JP2011/000993**

§ 371 (c)(1), (2), (4) Date: **Apr. 30, 2012**

(30) **Foreign Application Priority Data**

Feb. 23, 2010 (JP) 2010-037956

Publication Classification

(51) **Int. Cl.**

H01Q 21/00 (2006.01)

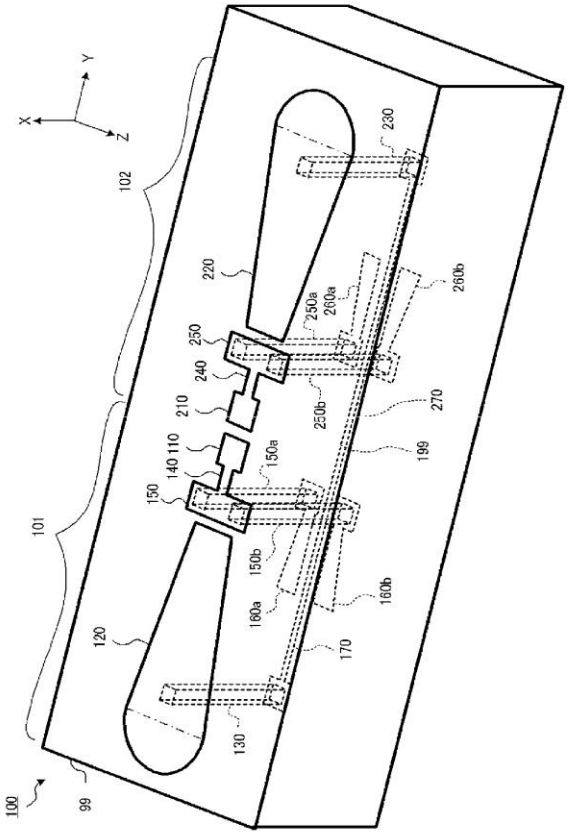
H01Q 5/00 (2006.01)

H01Q 19/10 (2006.01)

(52) **U.S. Cl.** **343/835**; 343/893

(57) **ABSTRACT**

The multifrequency antenna comprises a substrate, antenna elements, shunt inductor conductors, series capacitor conductors, series inductor conductors, a connection point, and input/output terminals. The antenna elements are provided on the substrate and electrically connected to the connection point via the shunt inductor conductors. The antenna elements form capacitors together with the parts facing the series capacitor conductors and are electrically connected to the input/output terminals via these capacitors and series inductor conductors.



US 20120218163A1

(19) **United States**

(12) **Patent Application Publication**

Wong et al.

(10) **Pub. No.: US 2012/0218163 A1**

(43) **Pub. Date: Aug. 30, 2012**

(54) **MOBILE COMMUNICATION DEVICE AND ANTENNA STRUCTURE THEREOF**

(76) Inventors: **Kin-Lu Wong**, New Taipei City (TW); **Fang-Hsien Chu**, New Taipei City (TW)

(21) Appl. No.: **13/091,096**

(22) Filed: **Apr. 20, 2011**

(30) **Foreign Application Priority Data**

Feb. 25, 2011 (TW) 100106391

Publication Classification

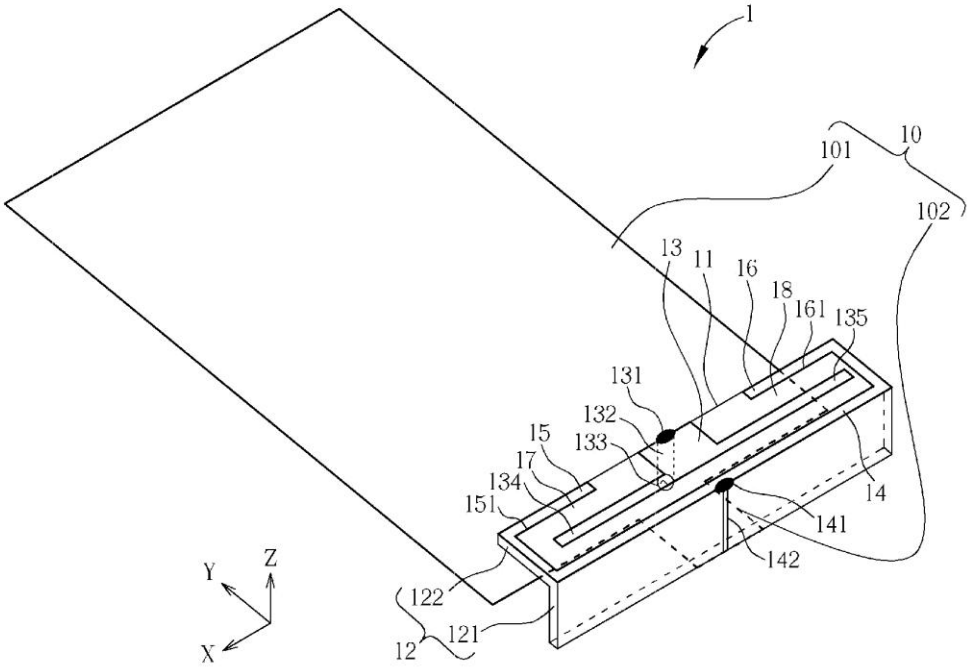
(51) **Int. Cl.**

H01Q 9/06 (2006.01)
H01Q 5/01 (2006.01)
H01Q 1/48 (2006.01)

(52) **U.S. Cl.** **343/843**; 343/848

(57) **ABSTRACT**

A mobile communication device having an antenna structure includes a grounding element and an antenna element. The grounding element includes a main ground and a protruded ground being connected to an edge of the main ground. Antenna element includes a feeding portion and a radiating portion. The feeding portion includes a feeding point, a first strip and a second strip. The first strip and the second strip are both connected to the feeding point. The radiating portion includes a first open end, a second open end and a shorting point which is connected to the protruded ground by a short-circuiting strip. There is a first coupling gap between the first strip and a first section of the radiating portion having the first open end. There is a second coupling gap between the second strip and a second section of the radiating portion having the second open end.



US 20120218164A1

(19) **United States**

(12) **Patent Application Publication**

Jeng

(10) **Pub. No.: US 2012/0218164 A1**

(43) **Pub. Date: Aug. 30, 2012**

(54) **COMPACT SIZE ANTENNA OPERATING IN LTE FREQUENCY BANDS**

(75) Inventor: **Chang-Yueh Jeng**, Taipei Hsien (TW)

(73) Assignee: **ACER INCORPORATED**, Taipei Hsien (TW)

(21) Appl. No.: **13/150,779**

(22) Filed: **Jun. 1, 2011**

(30) **Foreign Application Priority Data**

Feb. 24, 2011 (TW) 100106162

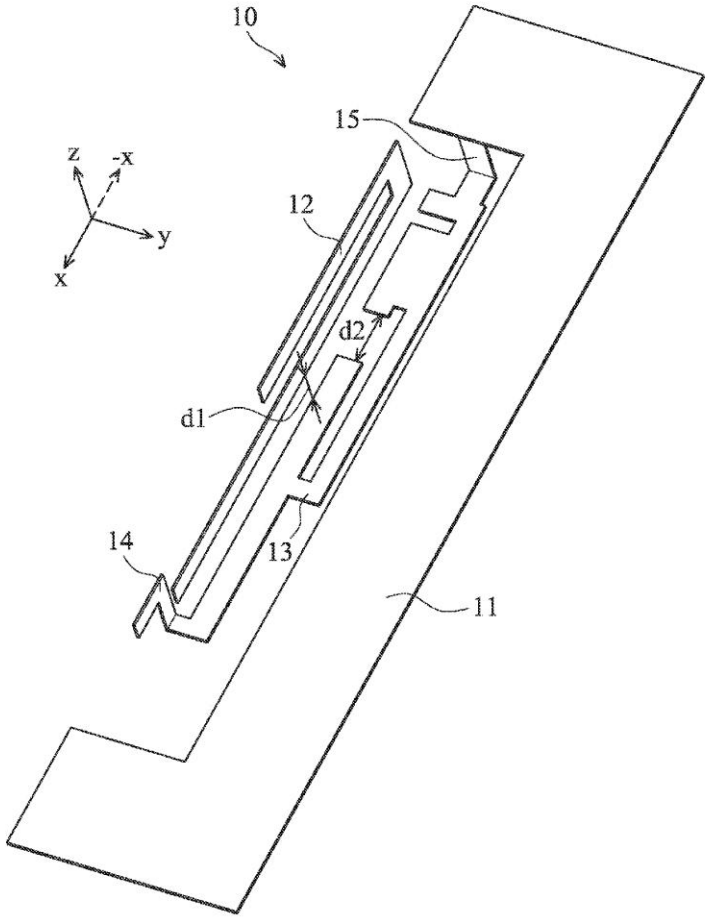
Publication Classification

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

(52) **U.S. Cl.** **343/848**

(57) **ABSTRACT**

A compact size antenna operating in LTE frequency bands includes a radiation element, a ground plane, a connecting piece, and a ground extension element. The radiation element at least includes a first radiation branch extending toward a first direction, wherein a connection end of the radiation element has a signal feeding point. The connecting piece is coupled to the ground plane. The ground extension element includes: a metal arm, coupled to the ground plane through the connecting piece; a first ground branch, coupled to the metal arm, and extending toward the first direction; a second ground branch coupled to the metal arm, and extending toward a second direction opposite to the first direction; and a third ground branch, coupled to the metal arm, coupled to the second ground branch, and extending toward the first direction.



US 20120218723A1

(19) **United States**

(12) **Patent Application Publication**

KWAK et al.

(10) **Pub. No.: US 2012/0218723 A1**

(43) **Pub. Date: Aug. 30, 2012**

(54) **MOBILE TERMINAL**

(75) Inventors: **Daeyong KWAK**, Gyeonggi-Do (KR); **Sungjung Rho**, Seoul (KR); **Kangjae Jung**, Seoul (KR)

(73) Assignee: **LG ELECTRONICS INC.**

(21) Appl. No.: **13/161,418**

(22) Filed: **Jun. 15, 2011**

(30) **Foreign Application Priority Data**

Feb. 25, 2011 (KR) 10-2011-0017410

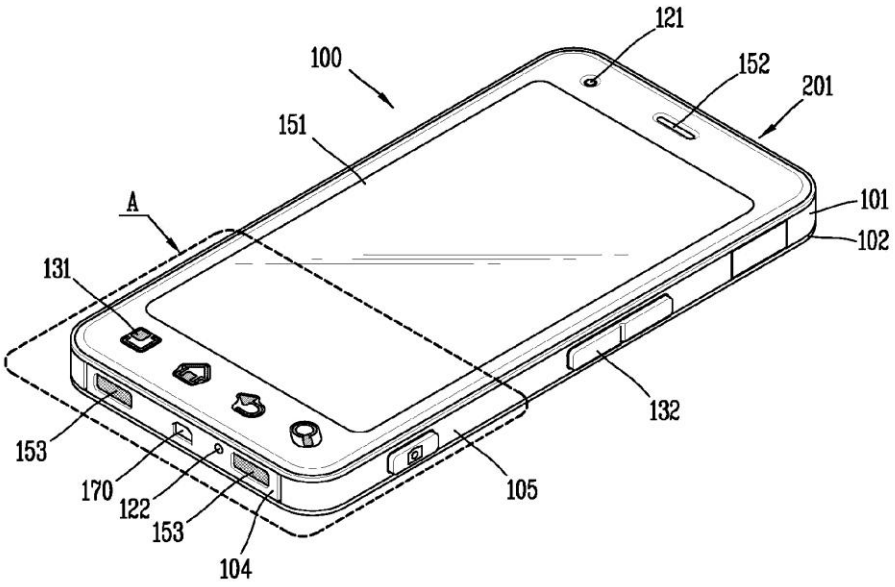
Publication Classification

(51) **Int. Cl.**
H05K 7/00 (2006.01)

(52) **U.S. Cl.** **361/748**

(57) **ABSTRACT**

Disclosed herein is a mobile terminal including a terminal body comprising a circuit board formed to process radio signals, a first and a second member configured to form an external appearance of the terminal and disposed to cover a lateral surface of the circuit board, a power feed connecting portion to allow the first member and the circuit board to be power feed connected, and a ground connecting portion to allow the first member and the circuit board to be ground connected. Accordingly, an electrical element and an antenna are disposed adjacent to each other, allowing the effective use of a space within the terminal.



US 20120223866A1

(19) **United States**

(12) **Patent Application Publication**

Ayala Vazquez et al.

(10) **Pub. No.: US 2012/0223866 A1**

(43) **Pub. Date: Sep. 6, 2012**

(54) **MULTI-ELEMENT ANTENNA STRUCTURE WITH WRAPPED SUBSTRATE**

(76) Inventors: **Enrique Ayala Vazquez**, Watsonville, CA (US); **Erik A. Uttermann**, San Francisco, CA (US); **Salih Yarga**, Sunnyvale, CA (US); **Qingxiang Li**, Mountain View, CA (US); **Robert W. Schlub**, Cupertino, CA (US)

(21) Appl. No.: **13/038,300**

(22) Filed: **Mar. 1, 2011**

Publication Classification

(51) **Int. Cl.**

H01Q 21/00 (2006.01)

H01Q 21/30 (2006.01)

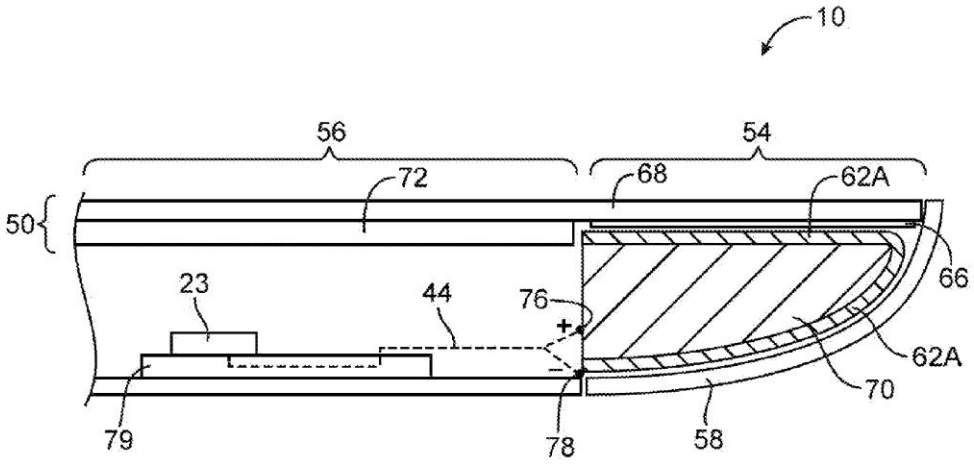
H01Q 19/02 (2006.01)

H01Q 1/24 (2006.01)

(52) **U.S. Cl.** **343/702**; 343/893; 343/833

(57) **ABSTRACT**

Antennas are provided for electronic devices such as portable computers. Multiple resonating elements may be formed on a flexible antenna resonating element substrate. The flexible antenna resonating element substrate may have a first antenna resonating element at one end and a second antenna resonating element at an opposing end. The flexible antenna resonating substrate may be wrapped around a dielectric carrier and mounted within an electronic device under an inactive display region and above a dielectric housing window. Conductive structures such as conductive housing structures may form antenna ground. The resonating elements and antenna ground may form first and second antennas. A parasitic antenna resonating element may form part of the first antenna.



US 20120223867A1

(19) **United States**

(12) **Patent Application Publication**

Morton et al.

(10) **Pub. No.: US 2012/0223867 A1**

(43) **Pub. Date: Sep. 6, 2012**

(54) **ANTENNA DEVICE AND PORTABLE RADIO COMMUNICATION DEVICE COMPRISING SUCH ANTENNA DEVICE**

(76) Inventors: **Lee Morton**, Uppsala (SE); **Peter Lindberg**, Uppsala (SE)

(21) Appl. No.: **13/371,745**

(22) Filed: **Feb. 13, 2012**

(30) **Foreign Application Priority Data**

Mar. 1, 2011 (EP) 11156438.1

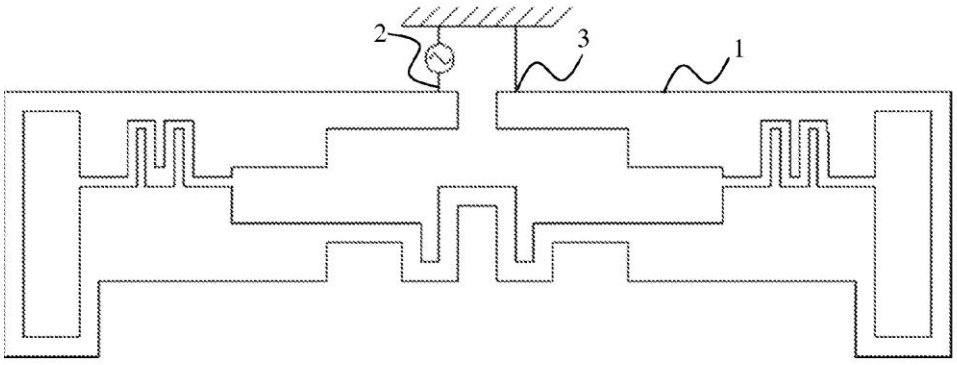
Publication Classification

(51) **Int. Cl.**
H01Q 11/12 (2006.01)

(52) **U.S. Cl.** **343/742**

(57) **ABSTRACT**

Exemplary embodiments are disclosed herein of antenna devices for radio communication devices. In an exemplary embodiment, an antenna device for a radio communication device is adapted for receiving radio signals in at least a first frequency band and a separate second frequency band. The antenna device includes a half-loop radiating. The first frequency band includes the first harmonic for the half-loop radiating element. The half-loop radiating element includes an inductive loading at a high current section for the third harmonic for the half-loop radiating element, such that the second frequency band includes the third harmonic for the half-loop radiating element.



US 20120223868A1

(19) **United States**

(12) **Patent Application Publication**

TU et al.

(10) **Pub. No.: US 2012/0223868 A1**

(43) **Pub. Date: Sep. 6, 2012**

(54) **SLOT ANTENNA**

(75) Inventors: **HSIN-LUNG TU**, Tu-Cheng (TW); **WEN-CHIEN MAO**, Tu-Cheng (TW)

(73) Assignee: **HON HAI PRECISION INDUSTRY CO., LTD.**, Tu-Cheng (TW)

(21) Appl. No.: **13/095,894**

(22) Filed: **Apr. 28, 2011**

(30) **Foreign Application Priority Data**

Mar. 4, 2011 (CN) 201110052089.2

Publication Classification

(51) **Int. Cl.**

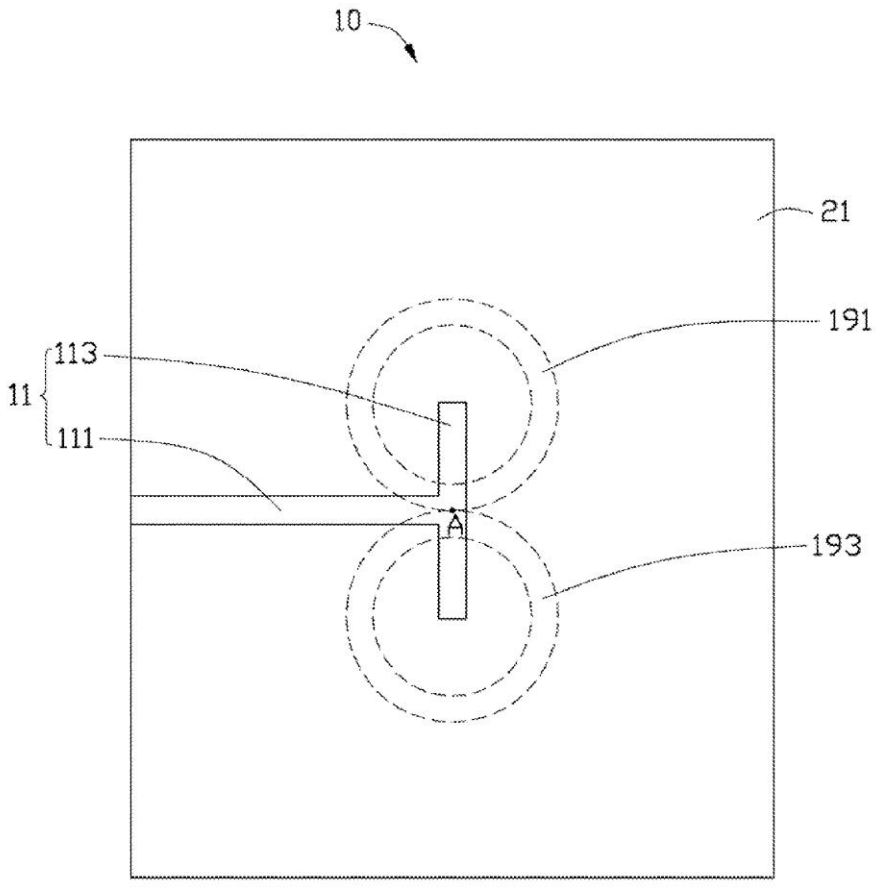
H01Q 13/10 (2006.01)

H01Q 13/12 (2006.01)

(52) **U.S. Cl.** **343/769**; 343/770

(57) **ABSTRACT**

A slot antenna is formed on a base. The base includes a first surface and an opposite second surface. The slot antenna includes a feeding portion formed on the first surface, a ground portion and a radiating portion formed on the second surface. The radiating portion includes a first radiating body being surrounded by a first slot, a second radiating body being surrounded by a second slot, a first switch and a second switch. The first switch is set between the first radiating body and the ground portion. The second switch is set between the second radiating body and the ground portion.



US 20120223869A1

(19) **United States**

(12) **Patent Application Publication**

KIM et al.

(10) **Pub. No.: US 2012/0223869 A1**

(43) **Pub. Date: Sep. 6, 2012**

(54) **MICROSTRIP PATCH ANTENNA INCLUDING PLANAR METAMATERIAL AND METHOD OF OPERATING MICROSTRIP PATCH ANTENNA INCLUDING PLANAR METAMATERIAL**

(75) Inventors: **Dong Ho KIM**, Daejeon (KR); **Jae Geun Ha**, Daegu (KR); **Young Ki Lee**, Jeju (KR); **Young Sung Lee**, Busan (KR); **Jae Hoon Choi**, Seoul (KR)

(73) Assignees: **INDUSTRY-UNIVERSITY COOPERATION FOUNDATION HANYANG UNIVERSITY**, Seoul (KR); **ELECTRONICS AND TELECOMMUNICATIONS RESEARCH INSTITUTE**, Daejeon (KR)

(21) Appl. No.: **13/179,140**

(22) Filed: **Jul. 8, 2011**

(30) **Foreign Application Priority Data**

Mar. 2, 2011 (KR) 10-2011-0018336

Publication Classification

(51) **Int. Cl.**

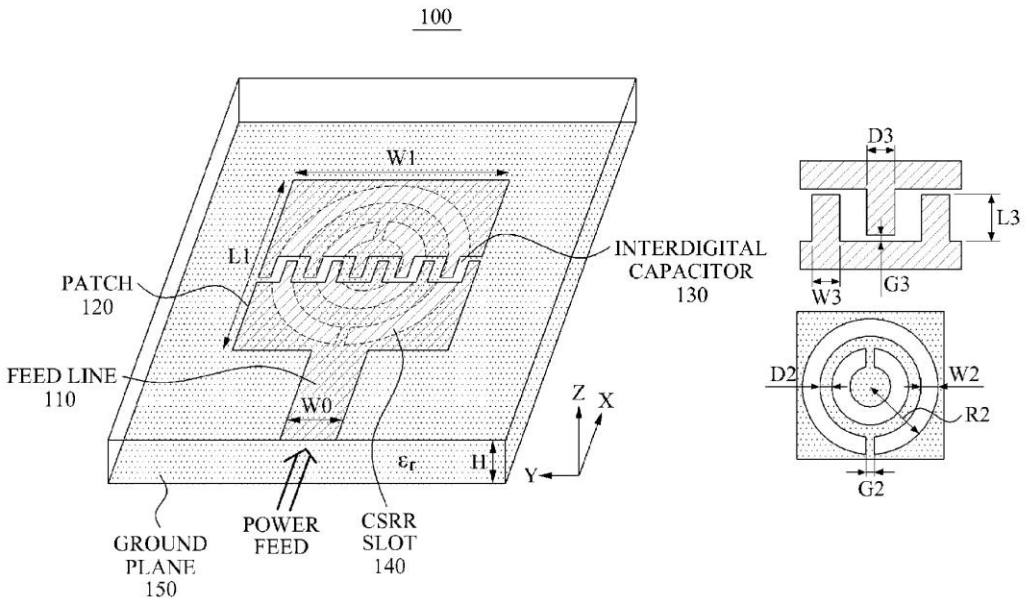
H01Q 13/12 (2006.01)

H01Q 5/01 (2006.01)

(52) **U.S. Cl.** **343/769**

(57) **ABSTRACT**

Provided is a microstrip patch antenna in which a unit cell of a planar metamaterial may be inserted to have a miniaturized size, a wide bandwidth, or multi-resonance.



US 20120229344A1

(19) **United States**

(12) **Patent Application Publication**

GUAN et al.

(10) **Pub. No.: US 2012/0229344 A1**

(43) **Pub. Date: Sep. 13, 2012**

(54) **ANTENNA DEVICE**

(75) Inventors: **Ning GUAN**, Sakura-shi (JP); **Hiroiku TAYAMA**, Sakura-shi (JP)

(73) Assignee: **FUJIKURA LTD.**, Tokyo (JP)

(21) Appl. No.: **13/474,893**

(22) Filed: **May 18, 2012**

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2010/070728, filed on Nov. 19, 2010.

(30) **Foreign Application Priority Data**

Nov. 19, 2009 (JP) 2009-263518
Feb. 25, 2010 (JP) 2010-040740

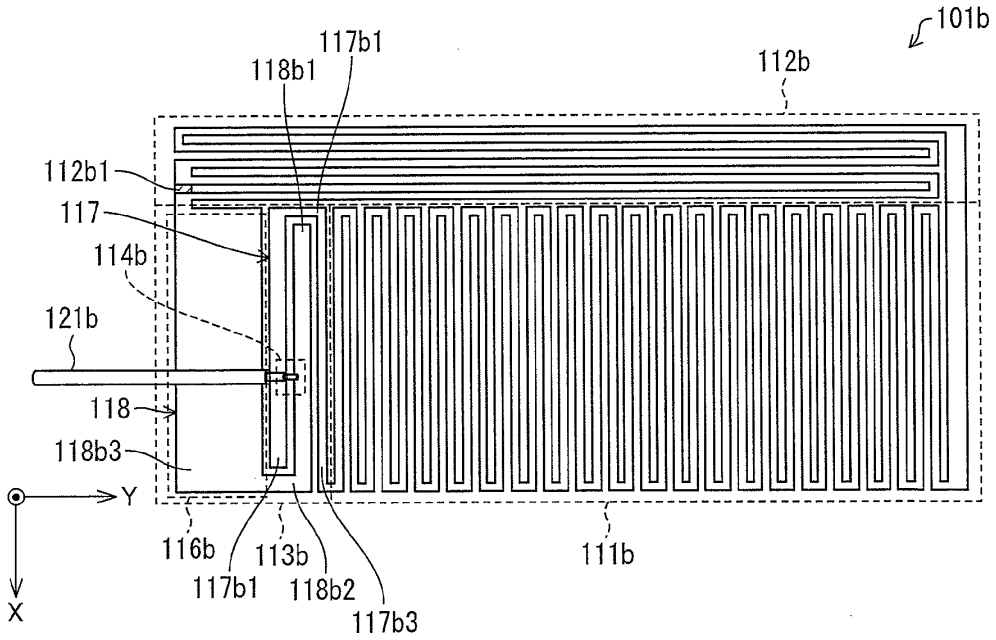
Publication Classification

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

(52) **U.S. Cl.** ..... **343/700 MS**

(57) **ABSTRACT**

An antenna device (**100**) includes an antenna element (**101**) and an electric conductor plate (**102**) provided so as to face the antenna element (**101**). The antenna element (**101**) and the electric conductor plate (**102**) are short-circuited by a short-circuit section (**104**). The antenna element (**101**) is connected with both of external and internal electric conductors (**122**) and (**123**) constituting a feed line (**121**).



US 20120229345A1

(19) **United States**

(12) **Patent Application Publication**

Takaki et al.

(10) **Pub. No.: US 2012/0229345 A1**

(43) **Pub. Date: Sep. 13, 2012**

(54) **ANTENNA**

(75) Inventors: **Yasunori Takaki**, Tottori-shi (JP); **Akinori Misawa**, Tottori-shi (JP)

(73) Assignee: **HITACHI METALS, LTD.**, Minatu-ku, Tokyo (JP)

(21) Appl. No.: **13/510,742**

(22) PCT Filed: **Nov. 19, 2010**

(86) PCT No.: **PCT/JP2010/070731**

§ 371 (c)(1), (2), (4) Date: **May 18, 2012**

(30) **Foreign Application Priority Data**

Nov. 20, 2009 (JP) 2009-264621
Feb. 10, 2010 (JP) 2010-027127

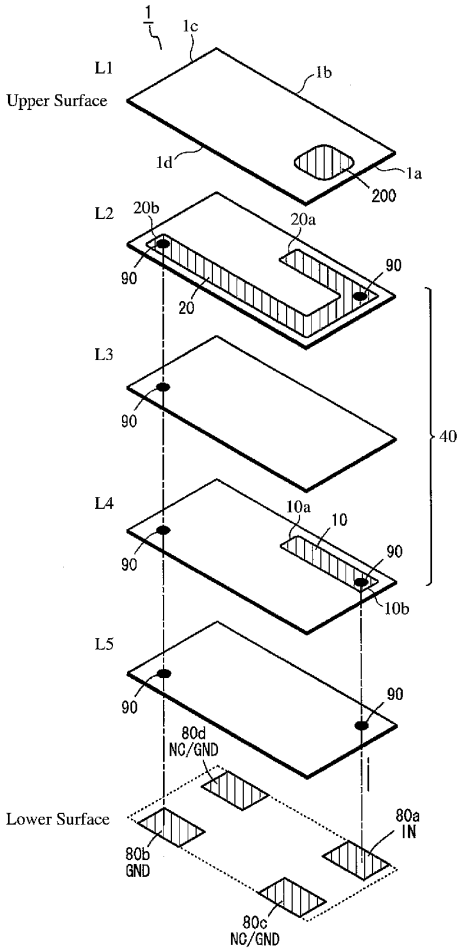
Publication Classification

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

(52) **U.S. Cl.** ..... **343/700 MS**

(57) **ABSTRACT**

An antenna comprising a laminate of dielectric ceramic layers each provided with electrode patterns, the laminate comprising a first terminal electrode connected to a feed line and a second terminal electrode for grounding on the lower surface, a radiation electrode on the upper surface or on a layer near the upper surface, and a coupling electrode between the lower surface and the radiation electrode; the coupling electrode being connected to the first terminal electrode through via-holes; the radiation electrode being connected to the second terminal electrode through via-holes; and the coupling electrode being partially opposite to the radiation electrode in a lamination direction to form a capacitance-coupling portion.



US 20120229346A1

(19) **United States**

(12) **Patent Application Publication**

CHEN et al.

(10) **Pub. No.: US 2012/0229346 A1**

(43) **Pub. Date: Sep. 13, 2012**

(54) **HANDHELD DEVICE**

(75) Inventors: **Chien-Chih CHEN**, Taoyuan City (TW); **Chun-Wei TSENG**, Taoyuan City (TW); **Yen-Liang KUO**, Taoyuan City (TW); **Wan-Ming CHEN**, Taoyuan City (TW)

(73) Assignee: **HTC CORPORATION**, TAOYUAN CITY (TW)

(21) Appl. No.: **13/041,858**

(22) Filed: **Mar. 7, 2011**

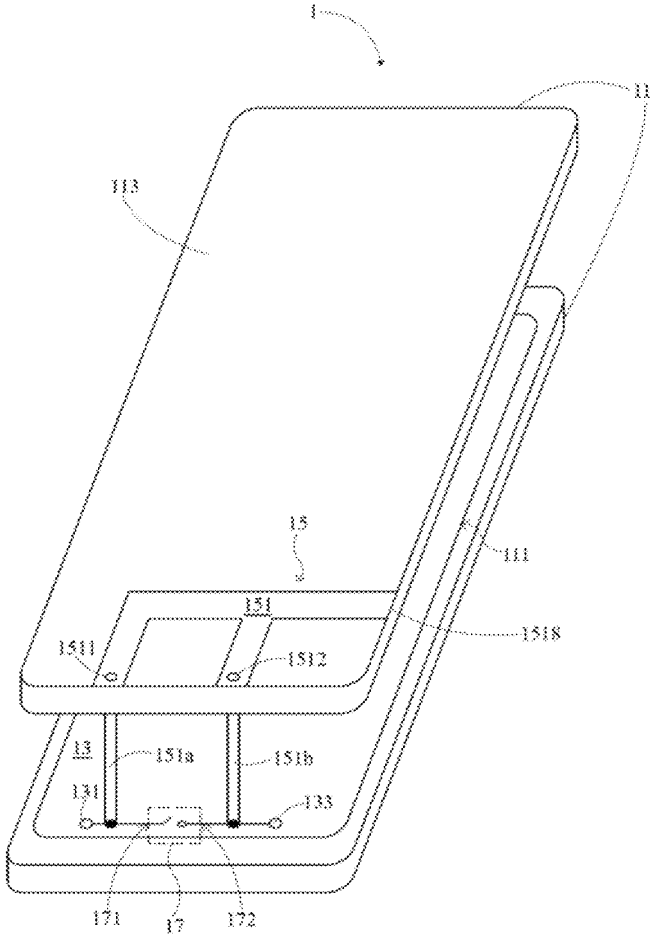
Publication Classification

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

(52) **U.S. Cl.** **343/702**

(57) **ABSTRACT**

A handheld device is provided, wherein the handheld device comprises a housing, a circuit board, a planar antenna and a switch. The housing comprising an outer surface is configured to define a receiving space. The circuit board is disposed in the receiving space. The planar antenna comprises a metal layer, wherein the metal layer comprising a first connecting point and a second connecting point is patterned on the outer surface. The switch comprising a first electrode and a second electrode is configured to control the electrical connection between the first connecting point and the second connecting point, wherein the first electrode and the second electrode are electrically connected between the first connecting point and the second connecting point. The planar antenna operates at a first central band when the switch is turned on, and operates at a second central band when the switch is turned off.



US 20120229347A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2012/0229347 A1**

(43) **Pub. Date: Sep. 13, 2012**

Jin et al.

(54) **TUNABLE ANTENNA SYSTEM WITH RECEIVER DIVERSITY**

(76) Inventors: **Nanbo Jin**, Sunnyvale, CA (US); **Mattia Pascolini**, San Mateo, CA (US); **Matt A. Mow**, Los Altos, CA (US); **Robert W. Schlub**, Cupertino, CA (US); **Ruben Caballero**, San Jose, CA (US)

(21) Appl. No.: **13/041,905**

(22) Filed: **Mar. 7, 2011**

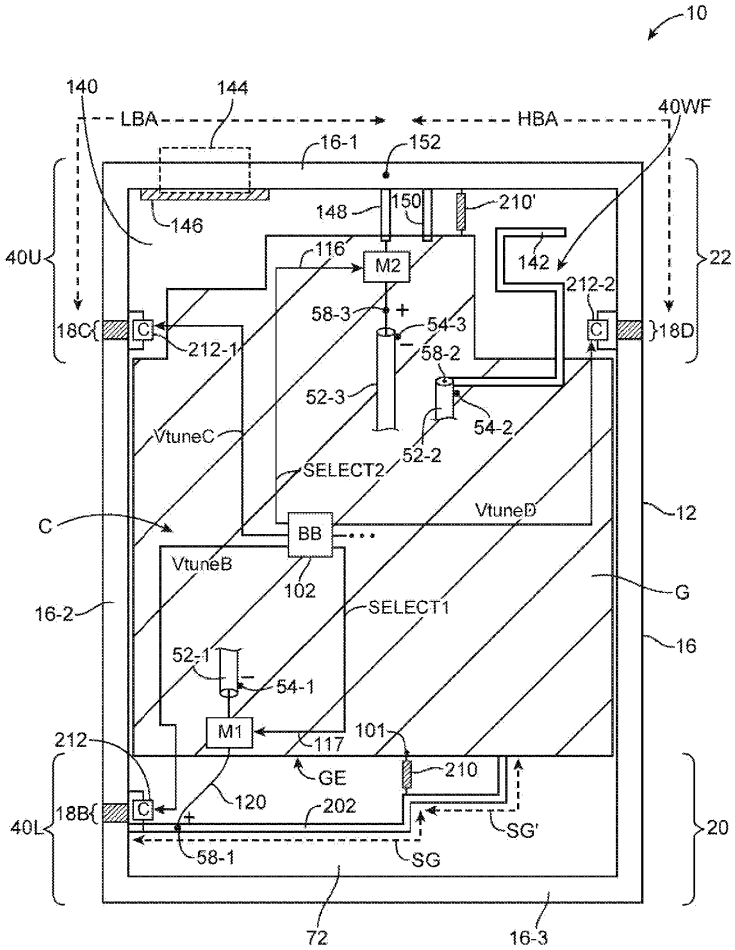
Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 5/01 (2006.01)

(52) **U.S. Cl.** **343/702**

(57) **ABSTRACT**

A wireless electronic device may include antenna structures and antenna tuning circuitry. The device may include a display mounted within a housing. A peripheral conductive member may run around the edges of the display and housing. Dielectric-filled gaps may divide the peripheral conductive member into individual segments. A ground plane may be formed within the housing. The ground plane and the segments of the peripheral conductive member may form antennas in upper and lower portions of the housing. The antenna tuning circuitry may include switchable inductor circuits and variable capacitor circuits for the upper and lower antennas. The switchable inductor circuits associated with the upper antenna may be tuned to provide coverage in at least two high-band frequency ranges of interest, whereas the variable capacitor circuits associated with the upper antenna may be tuned to provide coverage in at least two low-band frequency ranges of interest.



US 20120229348A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2012/0229348 A1**

(43) **Pub. Date: Sep. 13, 2012**

CHIANG

(54) **ANTENNA STRUCTURE AND ELECTRONIC DEVICE HAVING THE SAME**

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

(73) Assignee: **AUDEN TECHNO CORP.**, Bade City (TW)

(21) Appl. No.: **13/043,450**

(22) Filed: **Mar. 8, 2011**

Publication Classification

(51) **Int. Cl.**

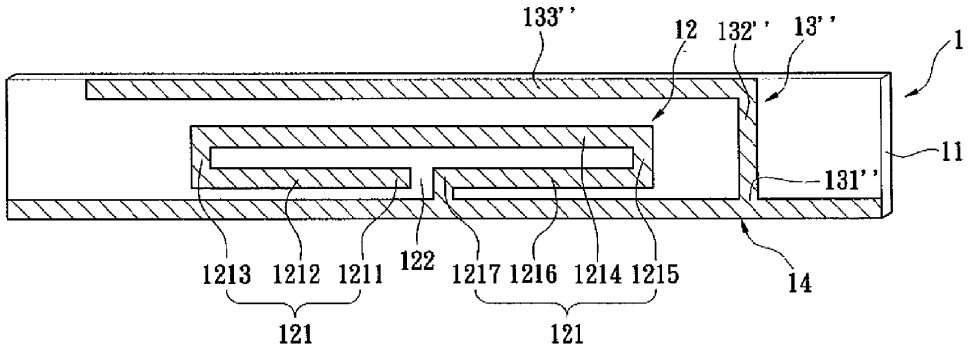
H01Q 1/38 (2006.01)

H01Q 1/24 (2006.01)

(52) **U.S. Cl.** ..... **343/702**; 343/700 MS

(57) **ABSTRACT**

An antenna structure is disclosed, which includes: a microwave substrate; and a first circuit, a second circuit, and a ground circuit disposed coplanarly on the microwave substrate. The first circuit is an open loop structure with a discontinuous portion and has a pair of ends, namely a feed point and a ground point, arranged respectively across the discontinuous portion. The ground point is connected to the ground circuit. The second circuit is disposed at the periphery of the first circuit, where the second circuit is connected to a connecting point of the first circuit on one side thereof. Thereby, the antenna structure reduces the SAR. In addition, an electronic device having an antenna structure is disclosed.



US 20120229349A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0229349 A1

(43) Pub. Date: Sep. 13, 2012

Badaruzzaman et al.

(54) **MOBILE WIRELESS COMMUNICATIONS DEVICE INCLUDING ANTENNA ASSEMBLY HAVING SHORTED FEED POINTS AND INDUCTOR-CAPACITOR CIRCUIT AND RELATED METHODS**

(75) Inventors: **Firass Mirza Badaruzzaman**, Oak Park, IL (US); **Shing Lung Steven Yang**, Rolling Meadows, IL (US); **Brian Francisco Rojas**, Chicago, IL (US)

(73) Assignee: **Research In Motion Limited**, Waterloo (CA)

(21) Appl. No.: **13/045,104**

(22) Filed: **Mar. 10, 2011**

Publication Classification

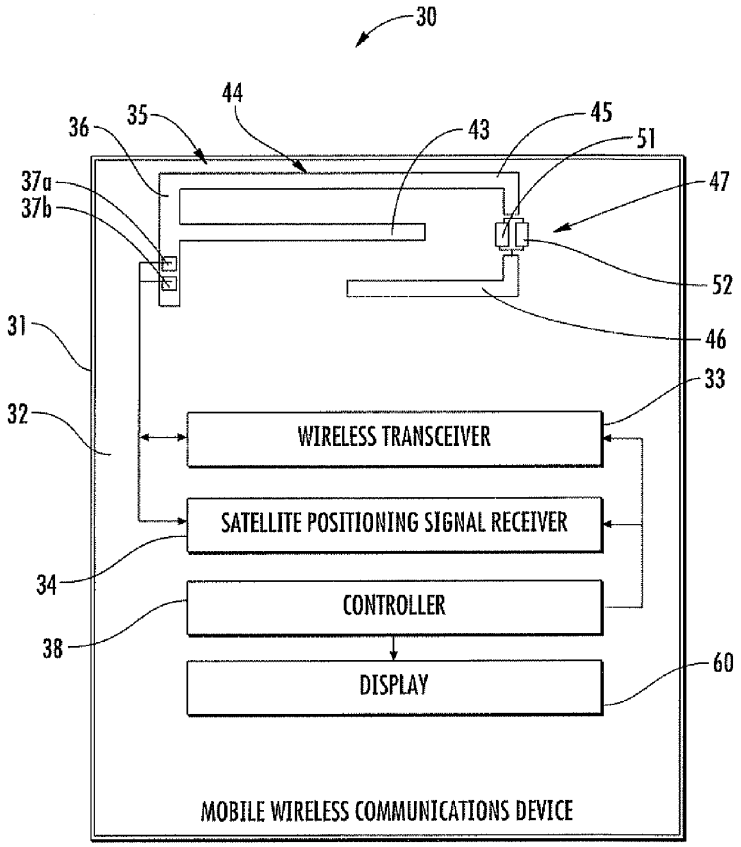
(51) **Int. Cl.**

H01Q 1/24	(2006.01)
H01P 11/00	(2006.01)
H01Q 1/36	(2006.01)

(52) **U.S. Cl.** **343/702**; 343/749; 29/600

(57) **ABSTRACT**

A mobile wireless communications device may include a portable housing, at least one wireless transceiver carried by the portable housing, and at least one satellite positioning signal receiver carried by the portable housing. The device may also include an antenna assembly carried by the portable housing. The antenna assembly may include a base conductor having a pair of shorted antenna feed points defined therein and coupled to the at least one wireless transceiver and the at least one satellite positioning receiver, and a first conductor aim extending outwardly from the base conductor. The antenna assembly may also include a second conductor arm also extending outwardly from the base conductor. The second conductor arm may include a proximal conductor portion adjacent the base conductor, a distal conductor portion, and an inductor-capacitor circuit coupling the proximal and distal conductor portions.



US 20120229350A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2012/0229350 A1**

(43) **Pub. Date: Sep. 13, 2012**

CHIANG

(54) **ANTENNA STRUCTURE AND ELECTRONIC DEVICE HAVING THE SAME**

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

(73) Assignee: **AUDEN TECHNO CORP.**, Taoyuan County (TW)

(21) Appl. No.: **13/045,506**

(22) Filed: **Mar. 10, 2011**

Publication Classification

(51) **Int. Cl.**

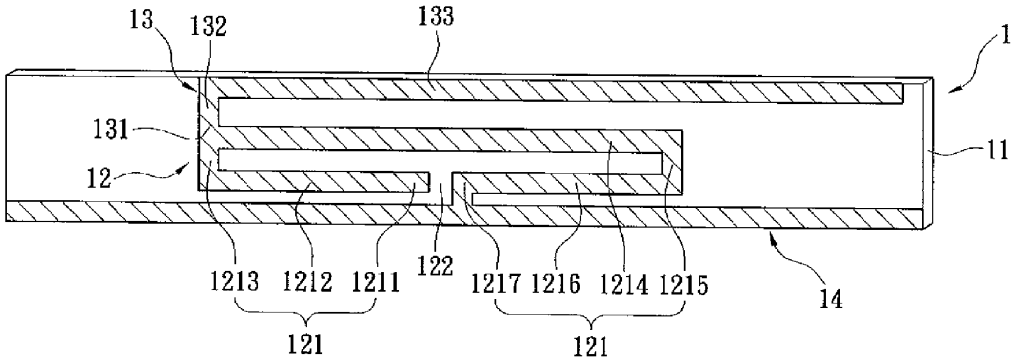
H01Q 1/38 (2006.01)

H01Q 1/24 (2006.01)

(52) **U.S. Cl.** ..... **343/702**; 343/700 MS

(57) **ABSTRACT**

An antenna structure is disclosed, which includes: a microwave substrate; and a first circuit, a second circuit, and a ground circuit disposed coplanarly on the microwave substrate. The first circuit is an open loop structure with a discontinuous portion having a feed point and a ground point, arranged respectively across the discontinuous portion. The second circuit is connected to a connecting point of the first circuit. The ground circuit is connected to the ground point of the first circuit and the second circuit at the connecting point of the ground circuit. Thus, the antenna structure reduces the SAR. In addition, an electronic device having the same is disclosed.



US 20120229357A1

(19) **United States**

(12) **Patent Application Publication**

HUNG et al.

(10) **Pub. No.: US 2012/0229357 A1**

(43) **Pub. Date: Sep. 13, 2012**

(54) **ANTENNA DEVICE WITH CHOKE SLEEVE STRUCTURES**

(75) Inventors: **TZU-CHIEH HUNG**, TAIPEI (TW); **SAOU-WEN SU**, TAIPEI (TW)

(73) Assignees: **LITE-ON TECHNOLOGY CORP.**, TAIPEI (TW); **SILITEK ELECTRONIC (GUANGZHOU) CO., LTD.**, GUANGZHOU (CN)

(21) Appl. No.: **13/236,866**

(22) Filed: **Sep. 20, 2011**

(30) **Foreign Application Priority Data**

Mar. 9, 2011 (CN) 201110058891.2

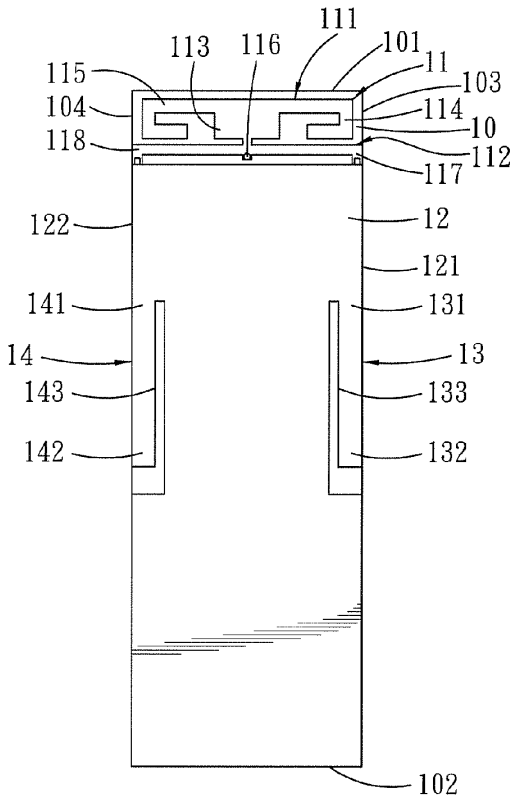
Publication Classification

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

(52) **U.S. Cl.** **343/848**

(57) **ABSTRACT**

An unbalanced antenna includes a non-conductive substrate having one short edge, and two long edges connected respectively to two opposite ends of the short edge and parallel to each other, and an unbalanced antenna disposed proximate to the short edge of the non-conductive substrate and having a ground portion. A ground plane has side edges extending along the long edges of the non-conductive substrate, and is electrically coupled with the ground portion. The length of the ground plane is longer than a quarter of an equivalent wavelength corresponding to an operating frequency of the unbalanced antenna. A pair of choke sleeve structures are symmetrically disposed at opposite sides of the ground plane and spaced apart from the unbalanced antenna by a quarter of an equivalent wavelength corresponding to the operating frequency. Each choke sleeve structure has one end connected to the ground plane, and the other end extending in a direction away from the unbalanced antenna.



US 20120229360A1

(19) **United States**

(12) **Patent Application Publication**

Jagielski et al.

(10) **Pub. No.: US 2012/0229360 A1**

(43) **Pub. Date: Sep. 13, 2012**

(54) **INDIRECT FED ANTENNA**

(75) Inventors: **Ole Jagielski**, Frederikshavn (DK); **Simon Svendsen**, Aalborg (DK)

(73) Assignee: **Molex Incorporated**, Lisle, IL (US)

(21) Appl. No.: **13/394,717**

(22) PCT Filed: **Sep. 7, 2010**

(86) PCT No.: **PCT/US10/47978**

§ 371 (c)(1), (2), (4) Date: **May 23, 2012**

Related U.S. Application Data

(60) Provisional application No. 61/240,644, filed on Sep. 8, 2009, provisional application No. 61/255,609, filed on Oct. 28, 2009, provisional application No. 61/319,514, filed on Mar. 31, 2010.

Publication Classification

(51) **Int. Cl.**

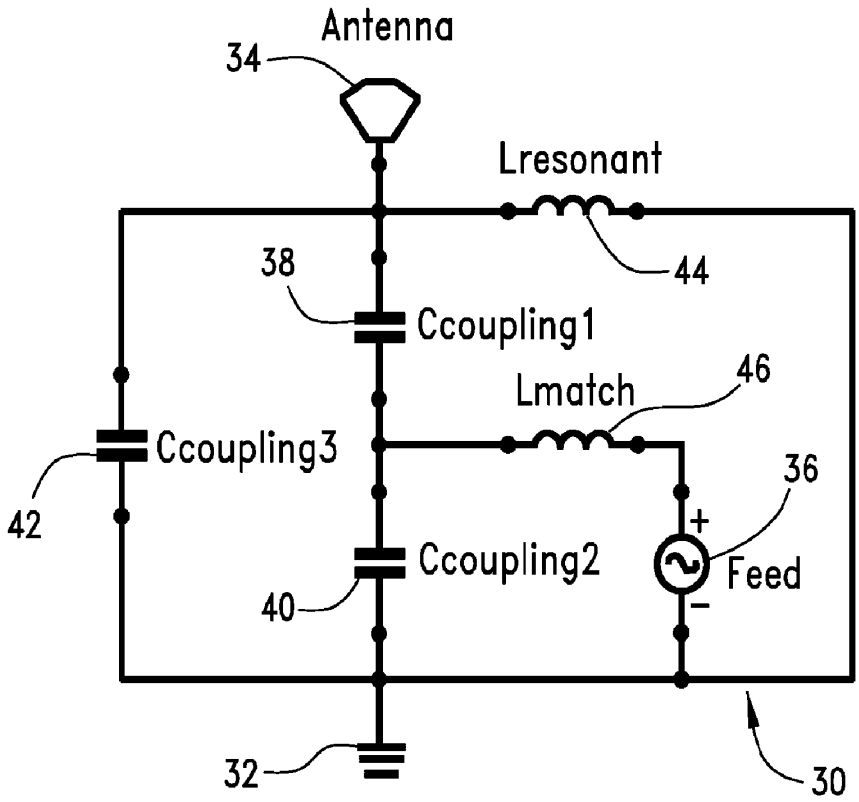
H01Q 1/50 (2006.01)

H01Q 1/38 (2006.01)

(52) **U.S. Cl.** **343/860**; 343/850

(57) **ABSTRACT**

An indirect-fed antenna system is disclosed. In an embodiment, a coupler is electrically coupled to a feed. The coupler capacitively couples to a resonating element and the resonating element is electrically coupled to a ground plane. The system allows for improved band-width and also allows for an antenna design where the resonant frequency, the bandwidth of the antenna, the location of the curl on a Smith chart and the associated impendence matching network can be separately adjusted.



US 20120230377A1

(19) **United States**

(12) **Patent Application Publication**

Jenwatanavet et al.

(10) **Pub. No.: US 2012/0230377 A1**

(43) **Pub. Date: Sep. 13, 2012**

(54) **MULTIBAND ANTENNA FOR A MOBILE DEVICE**

(75) Inventors: **Jatupum Jenwatanavet**, San Diego, CA (US); **Allen Minh-Triet Tran**, San Diego, CA (US); **Joe Chieu Le**, San Diego, CA (US)

(73) Assignee: **QUALCOMM Incorporated**, San Diego, CA (US)

(21) Appl. No.: **13/229,647**

(22) Filed: **Sep. 9, 2011**

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/077,039, filed on Mar. 31, 2011.

(60) Provisional application No. 61/387,954, filed on Sep. 29, 2010.

Publication Classification

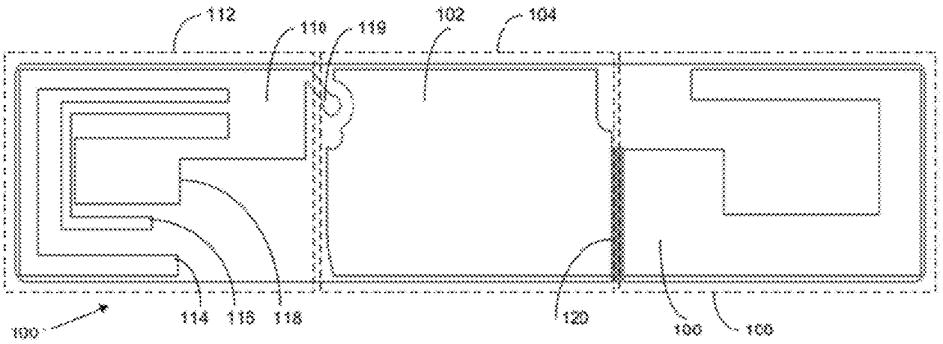
(51) **Int. Cl.**

H01Q 1/38	(2006.01)
H04B 1/38	(2006.01)
H01P 11/00	(2006.01)
H01Q 9/04	(2006.01)

(52) **U.S. Cl.** ..... **375/222**; 343/700 MS; 343/745; 29/600; 29/601

(57) **ABSTRACT**

A multiband antenna for a mobile device is disclosed. The multiband antenna includes a plurality of flexible antenna arms configured to communicate signals in multiple frequency bands, a flexible antenna counterpoise, a battery configured to provide power to the multiband antenna, and control logic configured to control communication of signals of the multiband antenna, where the plurality of flexible antenna arms, the flexible antenna counterpoise, the battery, and the control logic are bonded to a flexible insulation material. The multiband antenna further includes at least a portion of circuit schematics that connect the plurality of flexible antenna arms, the flexible antenna counterpoise, the battery and the control logic are placed and routed on the flexible insulation material.



US 20120231750A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2012/0231750 A1**

(43) **Pub. Date: Sep. 13, 2012**

Jin et al.

(54) **TUNABLE LOOP ANTENNAS**

(76) Inventors: **Nanbo Jin**, Sunnyvale, CA (US); **Mattia Pascolini**, Campbell, CA (US); **Matt A. Mow**, Los Altos, CA (US); **Robert W. Schlub**, Cupertino, CA (US); **Ruben Caballero**, San Jose, CA (US)

(21) Appl. No.: **13/041,934**

(22) Filed: **Mar. 7, 2011**

Publication Classification

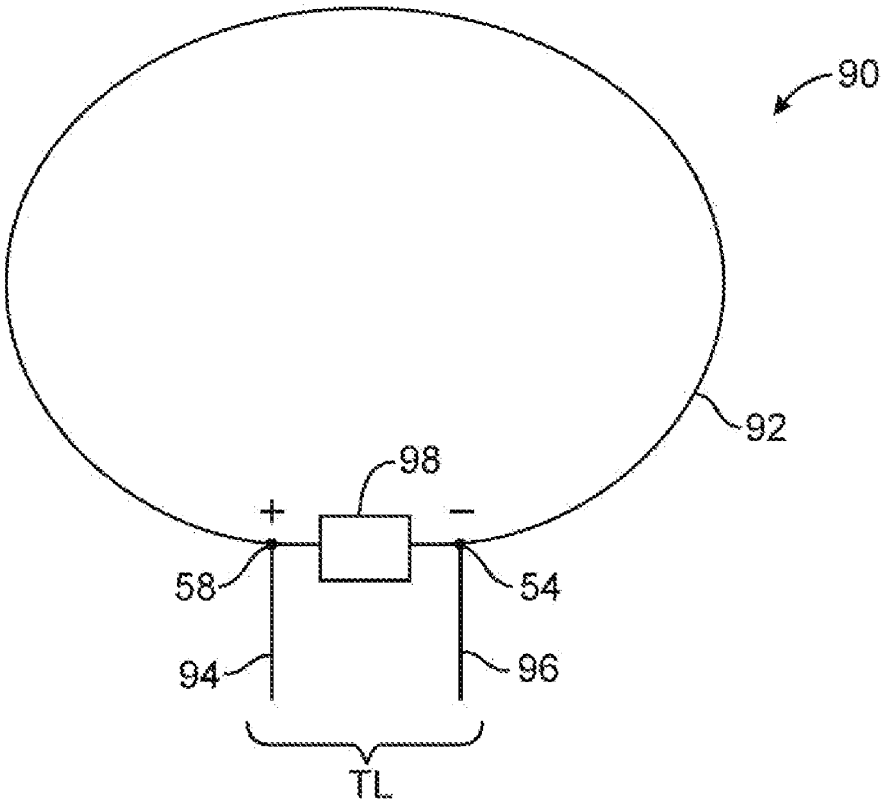
(51) **Int. Cl.**

H01Q 7/00	(2006.01)
H04W 88/02	(2009.01)
H01Q 1/24	(2006.01)

(52) **U.S. Cl.** **455/77**; 343/748; 343/702

(57) **ABSTRACT**

Electronic devices are provided that contain wireless communications circuitry. The wireless communications circuitry may include radio-frequency transceiver circuitry and antenna structures. A parallel-fed loop antenna may be formed from portions of a conductive bezel and a ground plane. The antenna may operate in multiple communications bands. The bezel may surround a peripheral portion of a display that is mounted to the front of an electronic device. The bezel may contain a gap. Antenna feed terminals for the antenna may be located on opposing sides of the gap. A variable capacitor may bridge the gap. An inductive element may bridge the gap and the antenna feed terminals. A switchable inductor may be coupled in parallel with the inductive element. Tunable matching circuitry may be coupled between one of the antenna feed terminals and a conductor in a coaxial cable connecting the transceiver circuitry to the antenna.



US 20120231846A1

(19) **United States**

(12) **Patent Application Publication**

Mahanfar

(10) **Pub. No.: US 2012/0231846 A1**

(43) **Pub. Date: Sep. 13, 2012**

(54) **SLOT ANTENNA**

(75) Inventor: **Alireza Mahanfar**, Bellevue, WA (US)

(73) Assignee: **MICROSOFT CORPORATION**, Redmond, WA (US)

(21) Appl. No.: **13/046,276**

(22) Filed: **Mar. 11, 2011**

Publication Classification

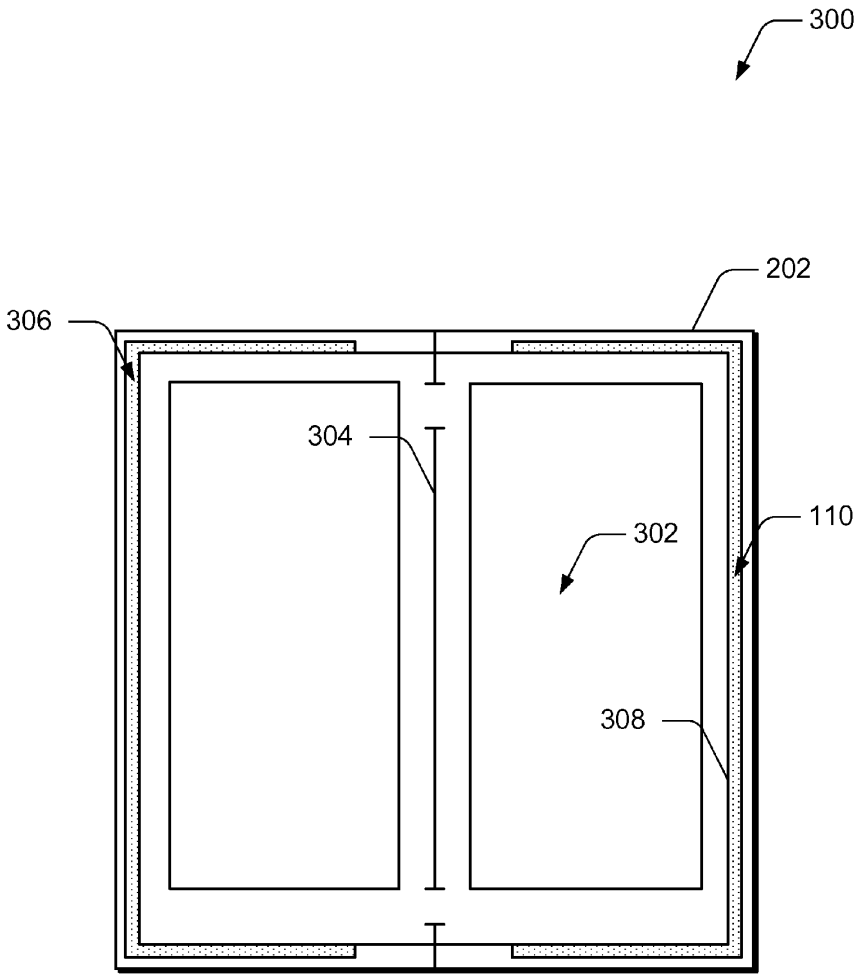
(51) **Int. Cl.**

H04M 1/00	(2006.01)
H01Q 21/00	(2006.01)
H01Q 13/10	(2006.01)

(52) **U.S. Cl.** **455/562.1**; 343/767; 343/770

(57) **ABSTRACT**

Techniques involving a slot antenna and associated functionality are described. In one or more implementations, the techniques describe a slot antenna that is usable for wireless communication in a mobile communication device. The mobile communication device may include one or more modules communicatively coupled to the slot antenna and configured to employ the slot antenna to enable the wireless communication.



US 20120235635A1

(19) **United States**

(12) **Patent Application Publication**

Sato

(10) **Pub. No.: US 2012/0235635 A1**

(43) **Pub. Date: Sep. 20, 2012**

(54) **ELECTRONIC APPARATUS**

(76) Inventor: **Koichi Sato**, Tachikawa-shi (JP)

(21) Appl. No.: **13/302,812**

(22) Filed: **Nov. 22, 2011**

(30) **Foreign Application Priority Data**

Mar. 18, 2011 (JP) 2011-061542

Publication Classification

(51) **Int. Cl.**

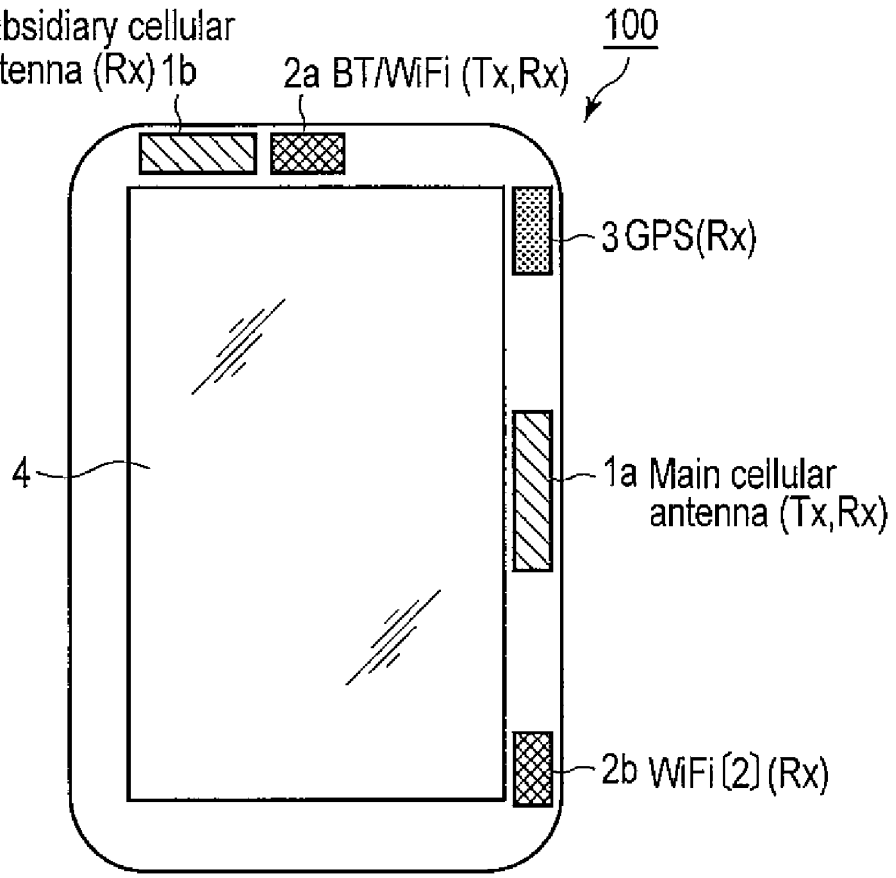
H02J 7/00 (2006.01)

H01Q 1/24 (2006.01)

(52) **U.S. Cl.** **320/108**; 343/702

(57) **ABSTRACT**

According to one embodiment, an electronic apparatus includes a display device with a display screen, a first wireless communication module, a second wireless communication module, first antennas for the first wireless communication module, and second antennas for the second wireless communication module. The display screen is exposed from a front surface of a housing. At least two of each of the first antennas and the second antennas are disposed in two perpendicular sides of the housing. The two perpendicular sides are peripheral parts of the display screen. One of the first antennas disposed in the two perpendicular sides and one of the second antennas disposed in the two perpendicular sides are disposed in respective center parts of the two perpendicular sides.



US 20120235867A1

(19) **United States**

(12) **Patent Application Publication**

Kim et al.

(10) **Pub. No.: US 2012/0235867 A1**

(43) **Pub. Date: Sep. 20, 2012**

(54) **META-MATERIAL MIMO ANTENNA**

(75) Inventors: **Jongguk Kim**, Seoul (KR); **Jeonghoon Cho**, Seoul (KR); **Sungtek Kahng**, Seoul (KR); **Jakwon Ku**, Seoul (KR); **Kyungsuk Kim**, Seoul (KR); **Geonho Jang**, Seoul (KR); **Seongryong Yoo**, Seoul (KR)

(73) Assignees: **Incheon University Industry Academic Cooperation Foundation**, Incheon (KR); **LG Innotek Co., Ltd.**, Seoul (KR)

(21) Appl. No.: **13/420,126**

(22) Filed: **Mar. 14, 2012**

(30) **Foreign Application Priority Data**

Mar. 14, 2011 (KR) 10-2011-0022358

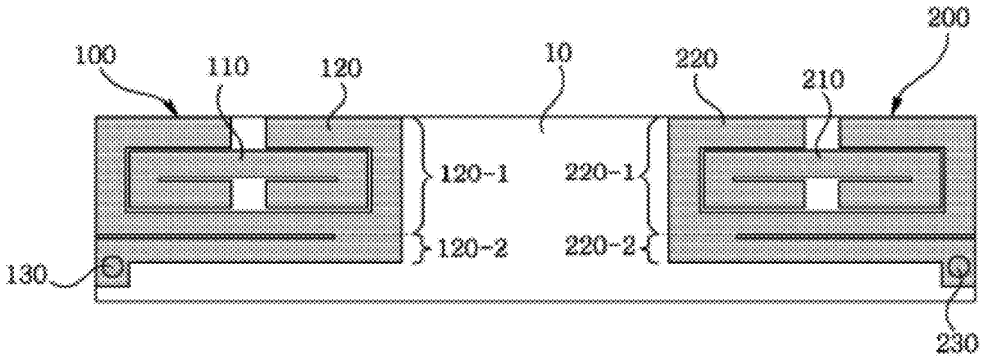
Publication Classification

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

(52) **U.S. Cl.** ..... **343/700 MS**

(57) **ABSTRACT**

A meta-material MIMO antenna is disclosed, wherein the meta-material MIMO antenna includes a substrate; a first top radiator formed at one side of top surface of the substrate, and including an inner radiator and an outer radiator discrete from the inner radiator to encompass the inner radiator from outside; a second top radiator symmetrically formed against the first top radiator and formed on the other side of the top surface of the substrate; a first bottom radiator electrically connected to the first top radiator and formed on one side of bottom surface of the substrate; a second bottom radiator symmetrically formed against the first bottom radiator and formed on the other side of the bottom surface of the substrate; and a coupler remover interposed between the first and second bottom radiators, whereby the antenna can be miniaturized to enhance a high isolation.



US 20120235875A1

(19) **United States**

(12) **Patent Application Publication**

HUNG et al.

(10) **Pub. No.: US 2012/0235875 A1**

(43) **Pub. Date: Sep. 20, 2012**

(54) **SMALL SHORTED PATCH ANTENNA**

(75) Inventors: **TZU-CHIEH HUNG**, TAIPEI (TW); **SAOU-WEN SU**, TAIPEI (TW)

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(22) Filed: **Sep. 2, 2011**

(30) **Foreign Application Priority Data**

Mar. 18, 2011 (CN) 201110069642.3

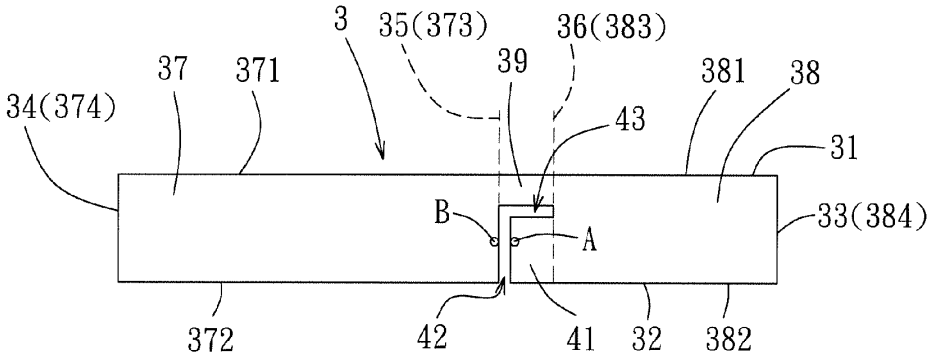
Publication Classification

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

(52) **U.S. Cl.** **343/846**

(57) **ABSTRACT**

A patch antenna includes a metal plate having two parallel long edges and two short edges connected together. The metal plate has a first fold line and a second fold line that are parallel to the two short edges and that partition the metal plate into a ground portion and a radiating portion, the former being longer than the latter but not longer than twice the length of the latter. The metal plate has a shorting portion between the first and second fold lines. A feed-in portion extends from the second fold line toward the first fold line, forms a first slit with the ground portion, and forms a second slit with the shorting portion. Both slits are interconnected. The shorting portion is perpendicular with respect to the ground portion. The radiating portion is perpendicular with respect to the shorting portion and the feed-in portion.



US 20120235879A1

(19) **United States**

(12) **Patent Application Publication**

Eder et al.

(10) **Pub. No.: US 2012/0235879 A1**

(43) **Pub. Date: Sep. 20, 2012**

(54) **THREE DIMENSIONAL ANTENNA**

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(73) Assignee: **Molex Incorporated**, Lisle, IL (US)

(21) Appl. No.: **13/265,154**

(22) PCT Filed: **Apr. 14, 2010**

(86) PCT No.: **PCT/US10/31066**

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Related U.S. Application Data

(62) Division of application No. 61/171,110, filed on Apr. 21, 2009.

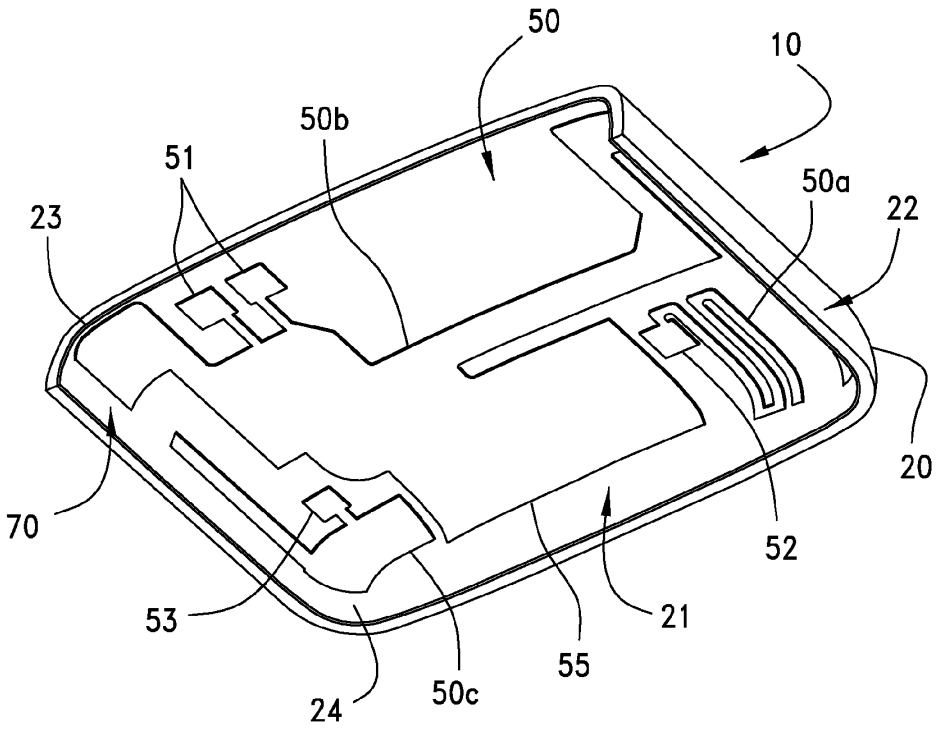
Publication Classification

(51) **Int. Cl.**
H01Q 1/12 (2006.01)
H01Q 1/40 (2006.01)

(52) **U.S. Cl.** **343/873**; 343/872; 343/878; 29/600

(57) **ABSTRACT**

An antenna shape can be inked onto a thin film and then the thin film can be shaped to form a three dimensional (3D) flex-film. The 3D flex-film can then be integrated into a carrier using conventional molding processes. The resultant housing includes a carrier that supports the 3D flex-film on an inner or outer surface of the carrier. The resultant housing thus allows for improved integration of an antenna with a housing so as to provide a more desirable housing for devices that can benefit from the corresponding antenna, such as, but not limited to, mobile devices.



US 20120242545A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2012/0242545 A1**

(43) **Pub. Date: Sep. 27, 2012**

CHIANG

(54) **ANTENNA STRUCTURE**

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(73) Assignee: **AUDEN TECHNO CORP.**, Taoyuan County (TW)

(21) Appl. No.: **13/071,593**

(22) Filed: **Mar. 25, 2011**

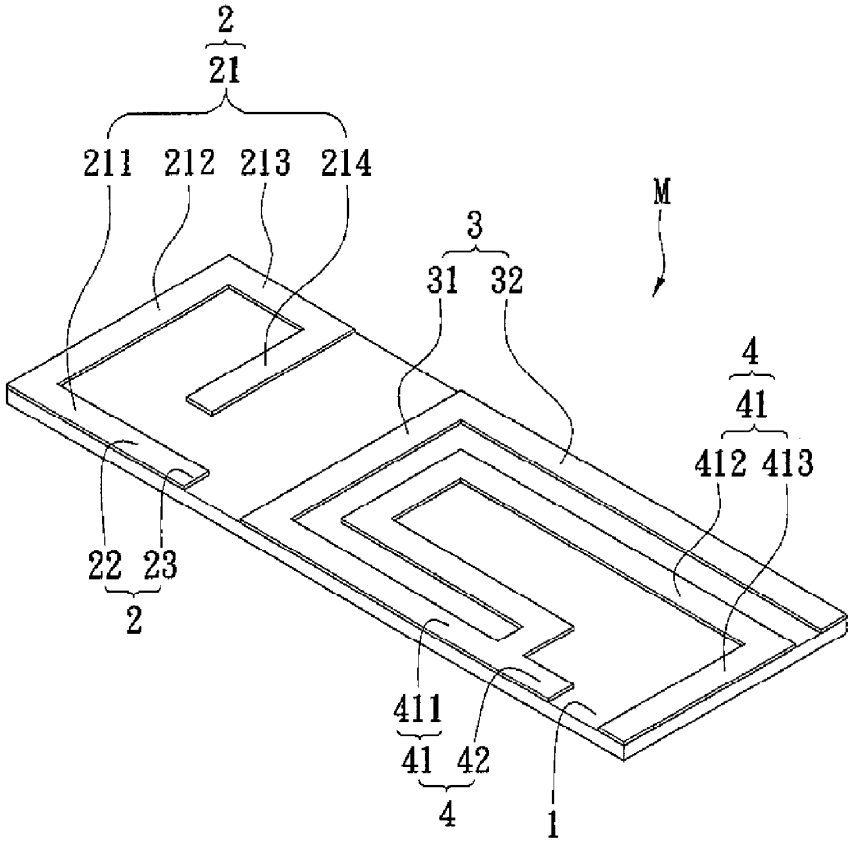
Publication Classification

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

(52) **U.S. Cl.** ..... **343/700 MS**

(57) **ABSTRACT**

An antenna structure includes a microwave substrate, a main-antenna unit, an extension grounding unit. The main antenna unit is arranged on the surface of the microwave substrate. The main antenna unit includes a main-radiation portion, a main-feeding portion, a main-grounding portion. The extension grounding unit is arranged on the surface of the microwave substrate. The extension grounding unit includes a first extension grounding portion and a second extension grounding portion. The antenna structure can adjust the radiation pattern and improve the antenna directivity. The main-antenna unit and the sub-antenna unit share the extension grounding unit in common. So, the antenna structure can reduce the antenna occupied volume and save the mass production cost.



US 20120242546A1

(19) **United States**

(12) **Patent Application Publication**

HU et al.

(10) **Pub. No.: US 2012/0242546 A1**

(43) **Pub. Date: Sep. 27, 2012**

(54) **ANTENNA MODULE**

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(73) Assignee: **WISTRON CORP.**, NEW TAIPEI CITY (TW)

(21) Appl. No.: **13/427,816**

(22) Filed: **Mar. 22, 2012**

(30) **Foreign Application Priority Data**

Mar. 25, 2011 (TW) TW100110322

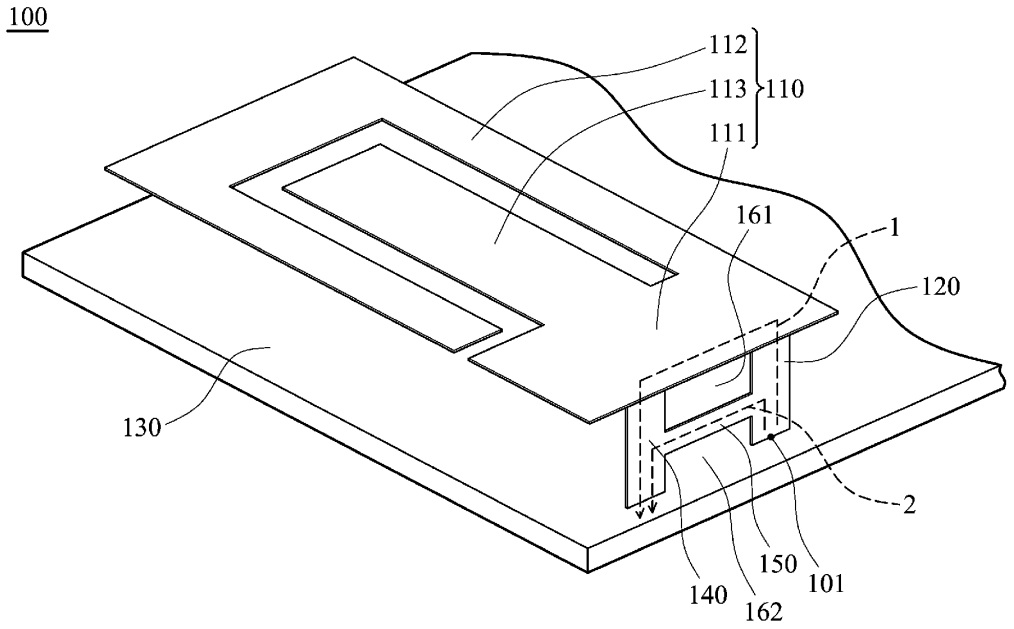
Publication Classification

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

(52) **U.S. Cl.** ..... **343/700 MS**

(57) **ABSTRACT**

An antenna module is provided. The antenna module includes a radiator, a feed conductor, a ground element, a ground conductor and a short conductor. The feed conductor is connected to the radiator. The ground conductor connects the radiator to the ground element. The short conductor connects the feed conductor to the ground conductor.



US 20120242548A1

(19) **United States**

(12) **Patent Application Publication**

BADARUZZAMAN et al.

(10) **Pub. No.: US 2012/0242548 A1**

(43) **Pub. Date: Sep. 27, 2012**

(54) **MOBILE WIRELESS COMMUNICATIONS DEVICE WITH SLOTTED ANTENNA AND RELATED METHODS**

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(21) Appl. No.: **13/072,004**

(22) Filed: **Mar. 25, 2011**

Related U.S. Application Data

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Publication Classification

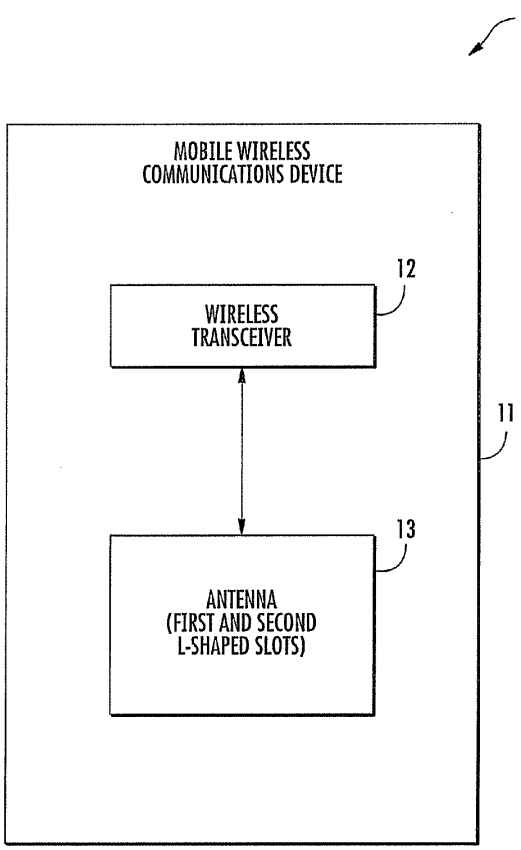
(51) **Int. Cl.**

H01Q 13/16	(2006.01)
H01P 11/00	(2006.01)
H01Q 1/24	(2006.01)

(52) **U.S. Cl.** **343/702**; 343/770; 29/600

(57) **ABSTRACT**

A mobile wireless communication device may include a multiple-band antenna on an antenna carrier and connected to a wireless transceiver. The multiple-band antenna may include an elongate base conductor having opposing first and second ends and opposing first and second sides extending between the first and second ends. The elongate base conductor may have a first L-shaped slot with a proximal end opening outwardly at the first side of the elongate base conductor adjacent the first end thereof and having a distal end adjacent a medial portion of the elongate base conductor. The elongate base conductor may have a second L-shaped slot with a proximal end opening outwardly at the first side of the elongate base conductor adjacent the medial portion thereof and having a distal end adjacent the second end of the elongate base conductor. The distal end of the second L-shaped slot may extend closer to the second end of the elongate base conductor than the distal end of the first L-shaped slot.



US 20120242555A1

(19) **United States**

(12) **Patent Application Publication**

Hsieh et al.

(10) **Pub. No.: US 2012/0242555 A1**

(43) **Pub. Date: Sep. 27, 2012**

(54) **ANTENNA MODULE**

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

(21) Appl. No.: **13/069,643**

(22) Filed: **Mar. 23, 2011**

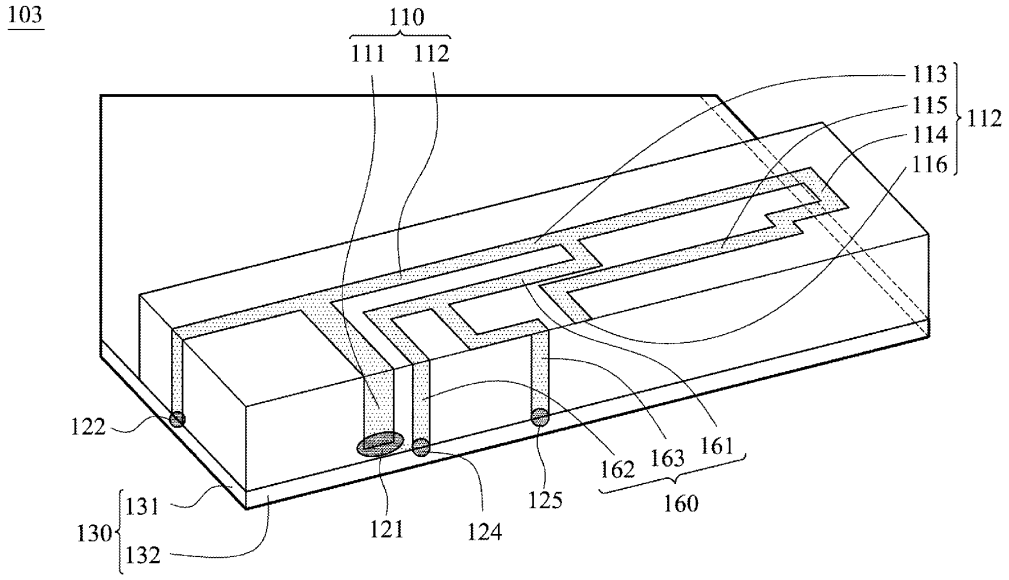
Publication Classification

(51) **Int. Cl.**
H01Q 19/02 (2006.01)
H01Q 1/50 (2006.01)

(52) **U.S. Cl.** **343/833**; 343/860

(57) **ABSTRACT**

An antenna module is provided. The antenna module includes a radiator, a feed pin, a ground element, a first parasitic arm, a second parasitic arm and an impedance matching unit. The radiator includes a first section and a second section, wherein an end of the first section is connected to the second section, and the first section is perpendicular to the second section. The feed pin is connected to another end of the first section. The first parasitic arm is parallel to the second section, wherein an end of first parasitic arm is connected to the ground element, and the first parasitic arm couples with the second section of the radiator. The impedance matching unit is connected to the second section and the ground element. The second parasitic arm is partially parallel to the first section, and the second parasitic arm couples with the first section of the radiator, and an end of the second parasitic arm is connected to the ground element.



US 20120242558A1

(19) **United States**

(12) **Patent Application Publication**

Song et al.

(10) **Pub. No.: US 2012/0242558 A1**

(43) **Pub. Date: Sep. 27, 2012**

(54) **RECONFIGURABLE ANTENNA**

(75) Inventors: **Peter Chun Teck Song**, Birmingham (GB); **Peter Hall**, Birmingham (GB); **James Robert Kelly**, Sheffield (GB)

(73) Assignee: **THE UNIVERSITY OF BIRMINGHAM**, Birmingham (GB)

(21) Appl. No.: **13/503,111**

(22) PCT Filed: **Oct. 18, 2010**

(86) PCT No.: **PCT/GB10/01918**

§ 371 (c)(1),
(2), (4) Date: **Jun. 18, 2012**

(30) **Foreign Application Priority Data**

Oct. 21, 2009 (GB) 0918477.1

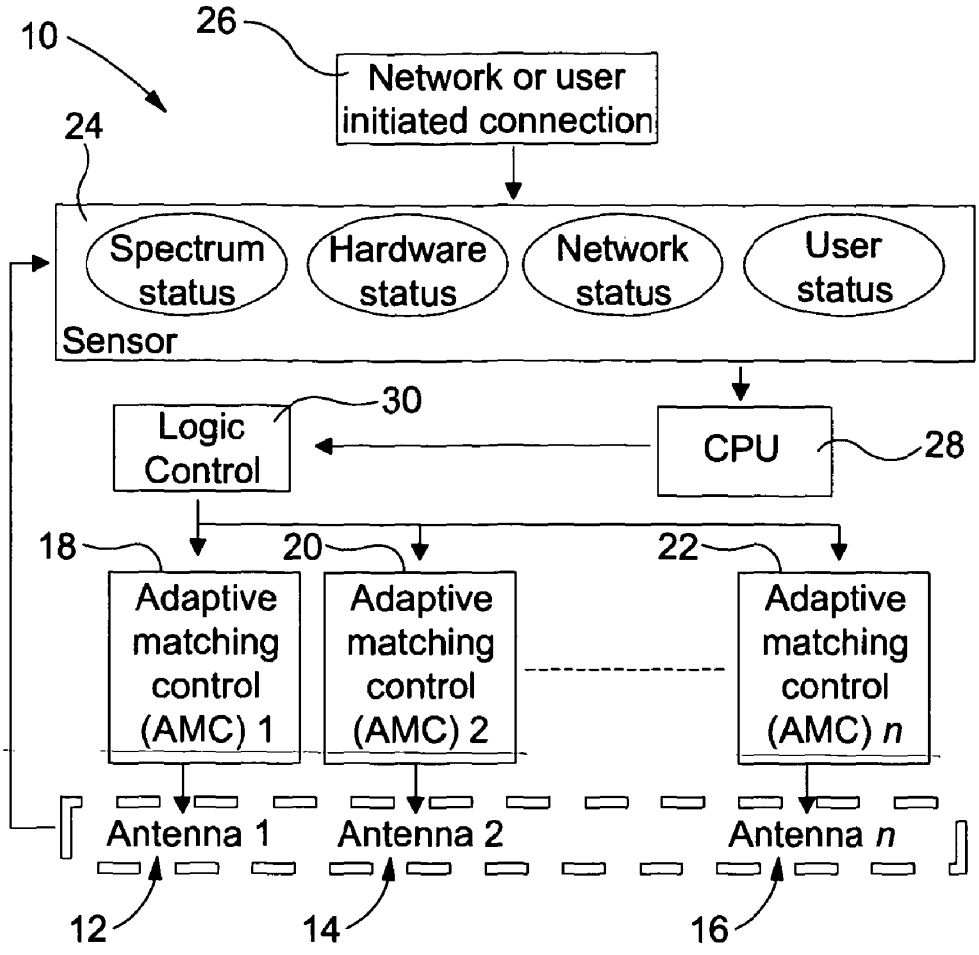
Publication Classification

(51) **Int. Cl.**
H01Q 21/00 (2006.01)
H03H 7/38 (2006.01)

(52) **U.S. Cl.** **343/852**; 333/124

(57) **ABSTRACT**

A reconfigurable antenna comprises two or more mutually coupled radiating elements and two or more impedance-matching circuits (**56**, **58**) configured for independent tuning of the frequency band of each radiating element. In addition, each radiating element is arranged for selective operation in each of the following states: a driven state, a floating state and a ground state.



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(19) United States

(12) Patent Application Publication

KANEKO et al.

(10) Pub. No.: US 2012/0242559 A1

(43) Pub. Date: Sep. 27, 2012

(54) **SUBSTRATE TYPE ANTENNA**

(75) Inventors: **Tutomu KANEKO**, Tokyo (JP); **Takahisa KARAKAMA**, Nakano-shi (JP)

(73) Assignees: **Faverights, Inc.**, Nakano-shi (JP); **NISSEI Limited**, Tokyo (JP)

(21) Appl. No.: **13/427,623**

(22) Filed: **Mar. 22, 2012**

(30) **Foreign Application Priority Data**

Mar. 23, 2011 (JP) 2011-064052

Publication Classification

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

(52) **U.S. Cl.** **343/853**

(57) **ABSTRACT**

The present invention provides a substrate type antenna having resonant frequencies different in a simple configuration. At least one loop-like another joint pattern one spot of which is divided is formed at a position opposite to a second joint pattern having common feeding points. Antennas are respectively connected to both end terminals of both of a first joint pattern and another joint pattern referred to above at their divided positions. The antennas connected to the first joint pattern and the antennas connected to another joint pattern referred to above are respectively made different in resonant frequency.