



US 20110001669A1

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

(10) **Pub. No.:** US 2011/0001669 A1
(43) **Pub. Date:** Jan. 6, 2011

(54) **DUAL-BAND ANTENNA AND WIRELESS NETWORK DEVICE HAVING THE SAME**

Publication Classification

(75) Inventors: **Yu-Jen Wang**, Taipei City (TW);
Wei-Bin Lee, Taipei City (TW)

(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 9/04 (2006.01)
H01Q 1/24 (2006.01)
(52) **U.S. Cl.** 343/700 MS; 343/702

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(57) **ABSTRACT**

A dual-band antenna for use in a wireless network device comprises first, second, and third radiators. The first and second radiators are connected by a stand portion. The second radiator is a generally C-shaped plate having a connecting section and a free-end portion. A ground end and an input end are provided at predetermined positions of the connecting section and are respectively and electrically connected to a grounding portion and a control circuit of a substrate. The free-end portion overlaps with the orthogonal projection of the first radiator and is parallel to the first radiator. The third radiator is electrically connected to the second radiator via a conductive post and is parallel to the second radiator. The second and third radiators are provided on the substrate while the first radiator is provided outside the substrate. The first, second, and third radiators are parallel to and spaced apart from one another.

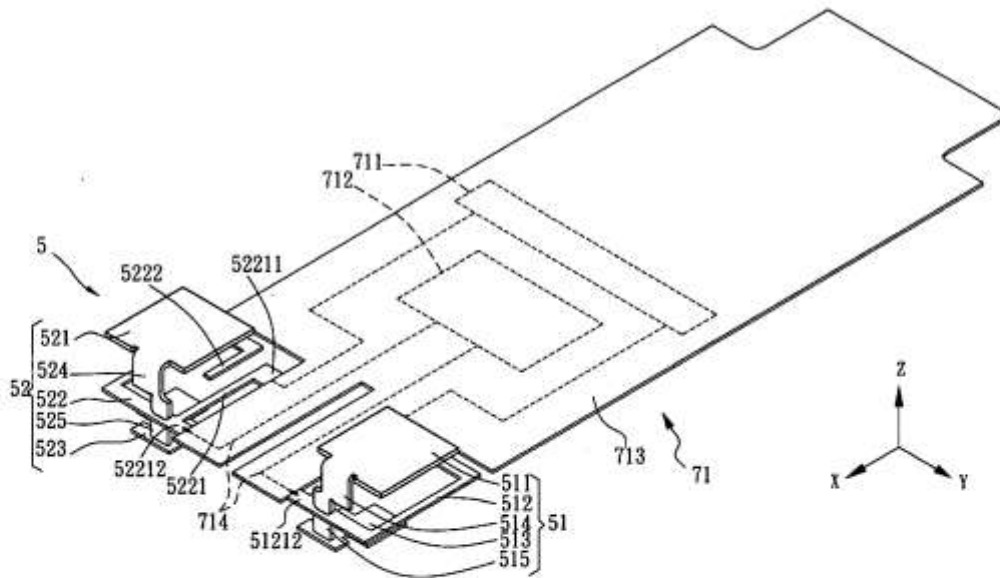
(73) Assignee: **Cameo Communications, Inc.**

(21) Appl. No.: **12/807,601**

(22) Filed: **Sep. 8, 2010**

(30) **Foreign Application Priority Data**

Jun. 9, 2009 (TW) 099210940





US 20110001671A1

(19) **United States**
(12) **Patent Application Publication**
Miura

(10) **Pub. No.:** US 2011/0001671 A1
(43) **Pub. Date:** Jan. 6, 2011

(54) **MOBILE COMMUNICATION TERMINAL**

Publication Classification

(75) **Inventor:** Yusuke Miura, Tokyo (JP)

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

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

(73) **Assignee:** **KABUSHIKI KAISHA**
TOSHIBA, TOKYO (JP)

(57) **ABSTRACT**

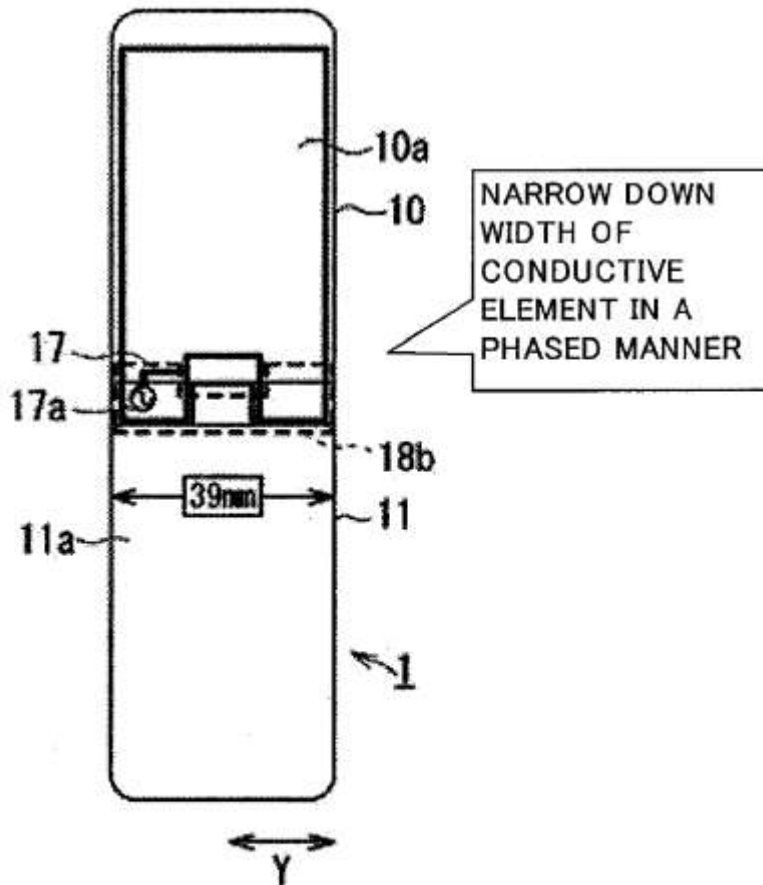
(21) **Appl. No.:** 12/715,643

(22) **Filed:** Mar. 2, 2010

A mobile communication terminal having a first housing section and a second housing section is provided. The first housing section includes a metallic portion. The second housing section is movably coupled to the first housing section. The second housing section is provided with an antenna. The second housing section is provided with a conductive element which covers a portion of the antenna from the metallic portion regardless of a position of the second housing section relative to the first housing section. The conductive element is electrically open.

(30) **Foreign Application Priority Data**

Jul. 2, 2009 (JP) 2009-157860





US 20110001672A1

(19) **United States**
(12) **Patent Application Publication**
Harihara

(10) **Pub. No.:** US 2011/0001672 A1
(43) **Pub. Date:** Jan. 6, 2011

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

Publication Classification

(76) Inventor: **Yasumasa Harihara, Tokyo (JP)**

(51) **Int. Cl.**
H01Q 1/38 (2006.01)
H01Q 1/00 (2006.01)
H01Q 1/24 (2006.01)
(52) **U.S. Cl.** **343/702; 343/787; 343/700 MS**

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WASHINGTON, DC 20005-3096 (US)

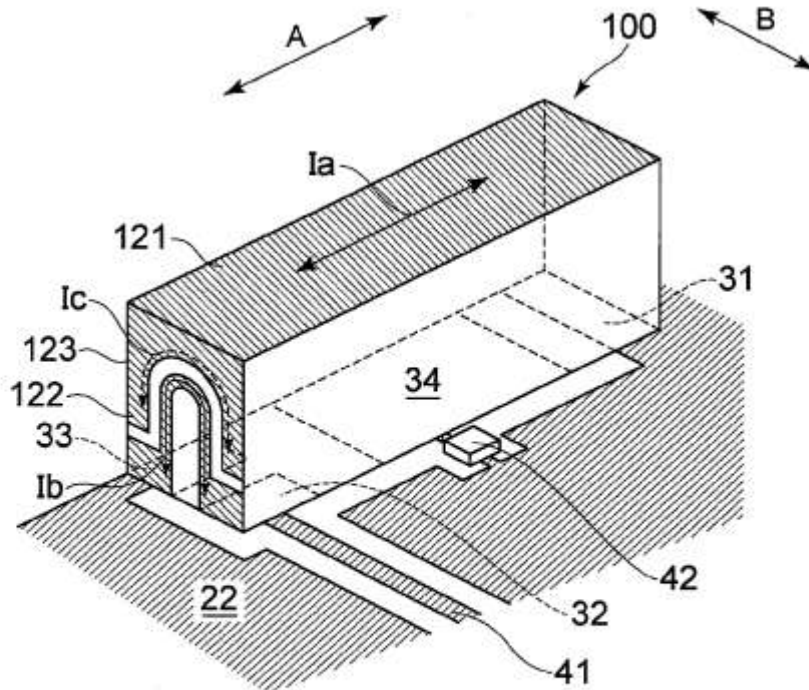
(57) **ABSTRACT**

An object of the present invention is to obtain high radiation efficiency by strengthening electromagnetic coupling in an antenna device that supplies a radiation current by the electromagnetic coupling. An antenna device includes a substrate 110 and a conductor pattern that includes a radiation conductor 121, a feed conductor 122, and a coupling conductor 123 formed on the substrate 110. Both the feed conductor 122 and the coupling conductor 123 are formed on a side surface 115 of the substrate 110. One end 122a of the feed conductor 122 is connected to a feed line, and other end 122b is connected to a ground pattern. A coupling portion 122b of the feed conductor 122 is substantially U-shaped, and the coupling conductor 123 is electromagnetically coupled to the coupling portion 122b of the feed conductor 122. Because the feed conductor 122 is gently curved, an electric field concentration can hardly occur. The length of the feed conductor 122 can be increased, and thus it is possible to obtain a strong electromagnetic coupling with the coupling conductor 123.

(21) Appl. No.: **12/809,856**
(22) PCT Filed: **Dec. 17, 2008**
(86) PCT No.: **PCT/JP2008/072912**
§ 371 (c)(1),
(2), (4) Date: **Sep. 28, 2010**

(30) **Foreign Application Priority Data**

Dec. 21, 2007 (JP) 2007-330581





US 20110001673A1

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

(10) **Pub. No.: US 2011/0001673 A1**
(43) **Pub. Date: Jan. 6, 2011**

(54) **PORTABLE TERMINAL**

Publication Classification

(76) Inventors: **Chisang YOU**, Gyeonggi-Do (KR);
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Jachyun Choi, Seoul (KR);
Songyi Lee, Gyeonggi-Do (KR);
Namyong Kim, Seoul (KR);
Yochuol Ho, Gyeonggi-Do (KR);
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(51) **Int. Cl.**
H01Q 1/24 (2006.01)
(52) **U.S. Cl.** **343/702**

(57) **ABSTRACT**

A portable terminal comprises a ground portion mounted in a body of the portable terminal, and configured to form electrical ground of a circuit board which controls the portable terminal, a conductive member mounted to a case which forms appearance of the body, and formed of a conductive material, a first radiator electrically connected to the ground portion so as to be fed by the ground portion, and configured to transmit and receive radio electromagnetic waves, a second radiator formed of a conductive material, and connected to the conductive member so as to form an antenna pattern together with the ground portion and the conductive member, the antenna pattern consecutive with a feed point of the first radiator, and a connection member configured to electrically connect edges of the ground portion to the conductive member such that the first radiator and the antenna pattern form a dipole antenna.

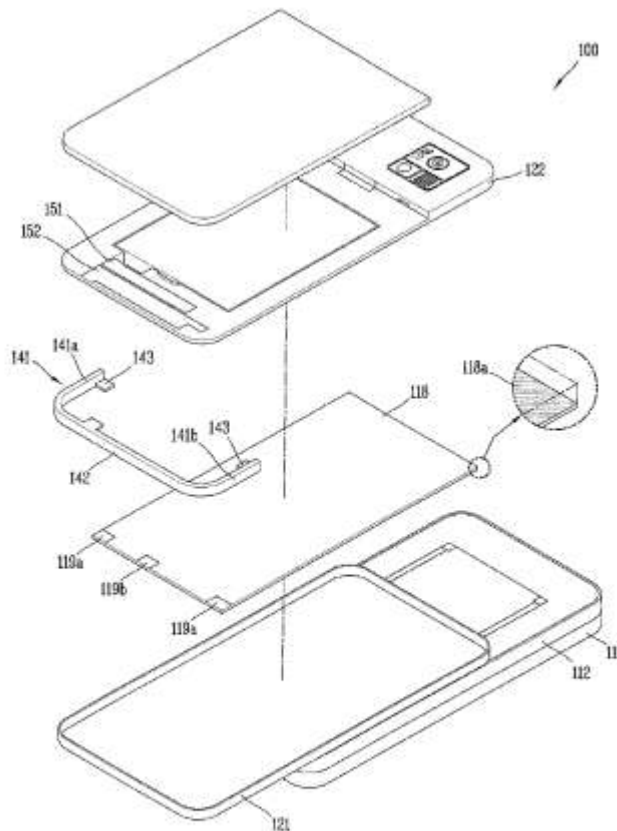
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(21) Appl. No.: **12/829,134**

(22) Filed: **Jul. 1, 2010**

(30) **Foreign Application Priority Data**

Jul. 2, 2009 (KR) 10-2009-0060349
Jul. 20, 2009 (KR) 10-2009-0066027





US 20110001675A1

(19) **United States**

(12) **Patent Application Publication**
LEE

(10) **Pub. No.: US 2011/0001675 A1**

(43) **Pub. Date: Jan. 6, 2011**

(54) **ANTENNA OF PORTABLE ELECTRONIC DEVICES**

Jul. 1, 2009 (CN) 200910503906.X

(75) Inventor: **YI-CHIEH LEE, Tu-Cheng (TW)**

Publication Classification

Correspondence Address:

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

(52) **U.S. CL.** **343/729; 343/728**

(73) Assignee: **CHI MEI COMMUNICATION SYSTEMS, INC., Tu-Cheng City (TW)**

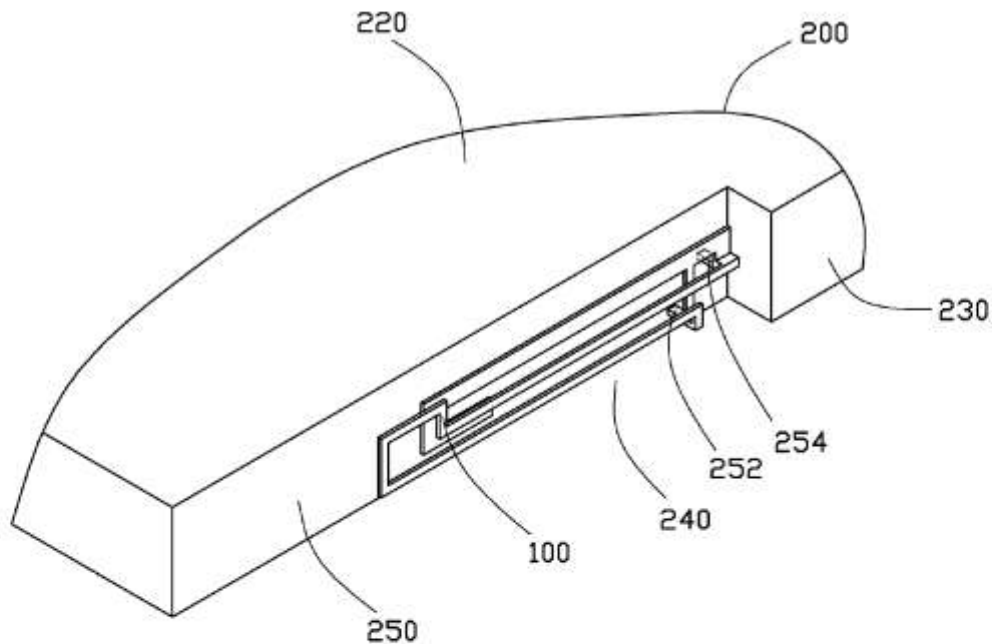
(57) **ABSTRACT**

An antenna used in portable electronic devices includes a first antenna unit shaped as a planar inverted-F antenna (PIFA) and a second antenna unit shaped as a loop antenna and connected to the first antenna unit. The first antenna unit receives/sends wireless signals at relatively higher frequencies, the second antenna unit receives/sends wireless signals at relatively lower frequencies, and the first antenna unit is coupled with the second antenna unit to regulate the working frequency band of the antenna.

(21) Appl. No.: **12/696,156**

(22) Filed: **Jan. 29, 2010**

(30) **Foreign Application Priority Data**





US 20110001676A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0001676 A1**

(43) **Pub. Date: Jan. 6, 2011**

(54) **ACTIVE TUNED LOOP-COUPLED ANTENNA**

Publication Classification

(76) Inventors: **Alf Friman, Vaxjo (SE); Sverker
Pettersson, Nybro (SE); Laurent
Desclos, San Diego, CA (US);
Jeffrey Shamblin, San Marcos, CA
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(51) **Int. Cl.**
H01Q 1/50 (2006.01)

(52) **U.S. CL.** **343/745**

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**Alf Friman
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(57) **ABSTRACT**

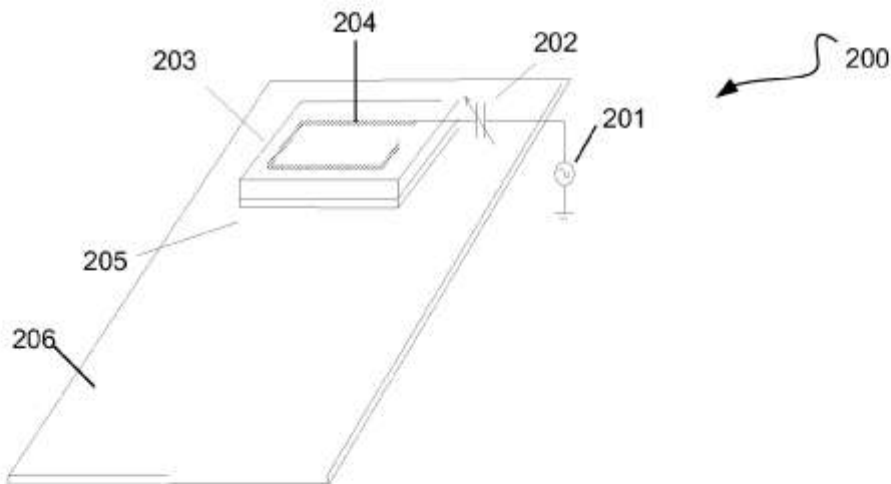
An active tuned loop-coupled antenna capable of optimizing performance over incremental bandwidths and capable of tuning over a large total bandwidth to be used in wireless communications. The active loop is capable of serving as the radiating element or a radiating element can be coupled to this active loop. Multiple active tuned loops can be coupled together to extend the total bandwidth of the antenna. Active components can be incorporated into the antenna structure to provide yet additional extension of the bandwidth along with increased optimization of antenna performance over the frequency range of the antenna.

(21) Appl. No.: **12/876,681**

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

Related U.S. Application Data

(63) Continuation of application No. 12/117,669, filed on May 8, 2008, now Pat. No. 7,812,774.





US 20110001681A1

(19) **United States**

(12) **Patent Application Publication**
HSU

(10) **Pub. No.: US 2011/0001681 A1**

(43) **Pub. Date: Jan. 6, 2011**

(54) **MULTIBAND ANTENNA**

Publication Classification

(75) **Inventor: Mao-Hsiu HSU, Tu-Cheng (TW)**

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

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ATTN: Steven Reiss

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(52) **U.S. CL.** **343/860; 343/700 MS**

(57) **ABSTRACT**

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

A multiband antenna includes a feed portion, a radiating portion and a matching portion. The radiating portion is operable to transceive electromagnetic signals, and includes a first radiator, a second radiator and a third radiator. The first radiator is connected to the feed portion, and includes a first free end and a second free end. The second radiator is bent, and includes a first feed end and a third free end, wherein the first feed end is connected to the feed portion. The third radiator is substantially L shaped, and includes a second feed end and a fourth free end, wherein the second feed end is electrically connected to the feed portion. The matching portion is rectangularly shaped, and electrically connected to the first radiator, for impedance matching.

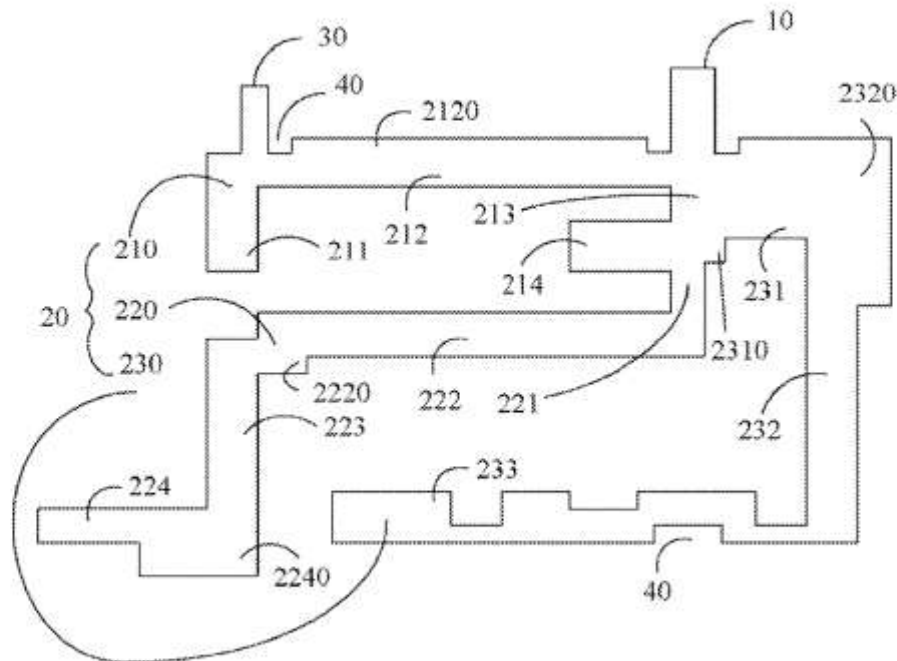
(21) **Appl. No.: 12/613,660**

(22) **Filed: Nov. 6, 2009**

(30) **Foreign Application Priority Data**

Jul. 2, 2009 (CN) 200920305547.7

100





US 20110006950A1

(19) **United States**

(12) **Patent Application Publication**

Park et al.

(10) **Pub. No.: US 2011/0006950 A1**

(43) **Pub. Date: Jan. 13, 2011**

(54) **MICROSTRIP ANTENNA COMPRISED OF TWO SLOTS**

(75) **Inventors:** Ikmo Park, Gyeonggi-do (KR);
Byoungchul Kim, Gyeonggi-do (KR);
Sung Min Han, Daejeon (KR);
Joon Gyu Ryu, Daejeon (KR);
Dae Ig Chang, Daejeon (KR);
Ho Jin Lee, Daejeon (KR)

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(73) **Assignees:** Electronics and
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(21) **Appl. No.: 12/920,047**

(22) **PCT Filed: Nov. 26, 2008**

(86) **PCT No.: PCT/KR2008/006969**

§ 371 (c)(1),
(2), (4) **Date: Aug. 27, 2010**

(30) **Foreign Application Priority Data**

Feb. 28, 2008 (KR) 10-2008-0018577

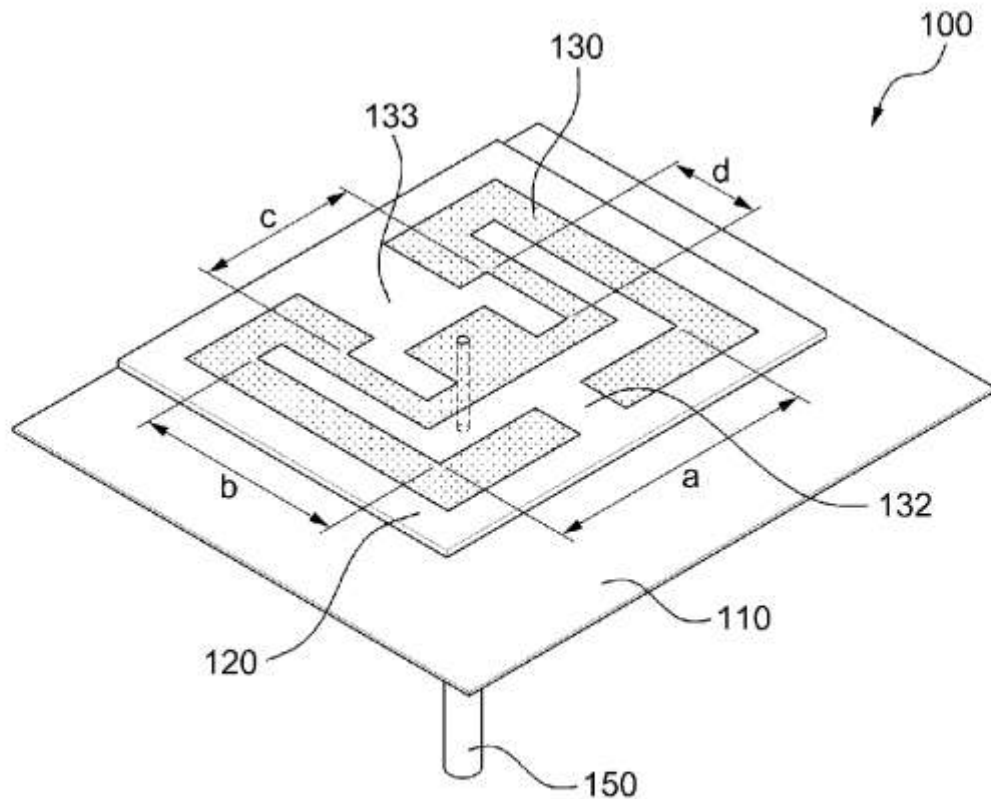
Publication Classification

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

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

(57) **ABSTRACT**

Disclosed relates to a microstrip antenna, particularly, relates to a dual band microstrip antenna including two slots. The microstrip antenna includes a conductor plate having a first hole and a substrate having a microstrip patch where slots of two different sizes are positioned, the substrate being located on a top of the conductor plate.





US 20110006952A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0006952 A1**

(43) **Pub. Date: Jan. 13, 2011**

(54) **MOBILE WIRELESS COMMUNICATIONS
DEVICE INCLUDING WRAP-AROUND
ANTENNA ASSEMBLY WITH FEED ARM
EXTENSION AND RELATED METHODS**

Publication Classification

(51) **Int. Cl.**
H01Q 1/38 (2006.01)
H01Q 1/24 (2006.01)
H01P 11/00 (2006.01)
(52) **U.S. CL.** **343/702; 29/600; 343/700 MS**

(75) **Inventors:** **Mina Ayatollahi, Waterloo (CA);
Ying Tong Man, Waterloo (CA);
Yihong Qi, Waterloo (CA); Perry
Jarmuszewski, Waterloo (CA)**

(57) **ABSTRACT**

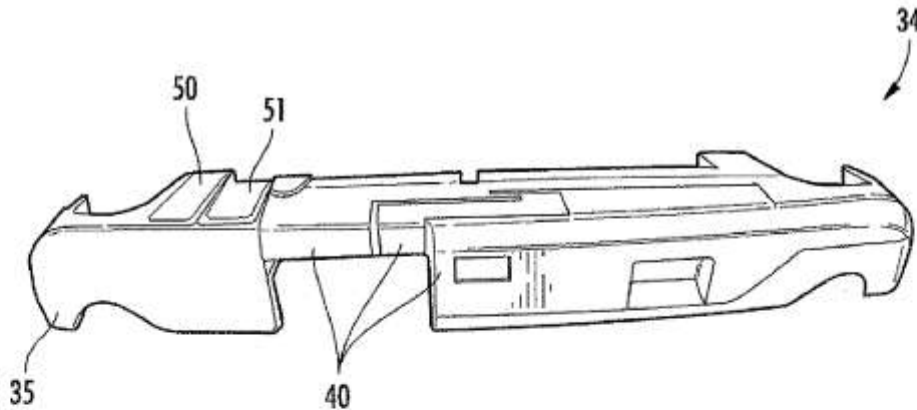
A mobile wireless communications device may include a portable housing, at least one wireless communications circuit carried by the portable housing, and a wrap-around antenna assembly carried by the portable housing. The wrap-around antenna assembly may include a substrate comprising a first portion and a second portion extending outwardly therefrom defining an L-shape, and a wrap-around antenna element lying along adjacent contiguous exterior surfaces of the first and second substrate portions. The wrap-around antenna assembly may further include an antenna feed arm lying along an interior surface of the first substrate portion and electrically coupled to the wrap-around antenna element, and a feed arm extension electrically coupled to the antenna feed arm and extending from the interior surface of the first substrate portion around to the exterior surface thereof.

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(73) **Assignee:** **Research in Motion Limited,**
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(21) **Appl. No.:** **12/499,169**

(22) **Filed:** **Jul. 8, 2009**





US 20110006953A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0006953 A1**

(43) **Pub. Date: Jan. 13, 2011**

(54) **CAVITY ANTENNAS FOR ELECTRONIC DEVICES**

(22) Filed: **Jul. 9, 2009**

Publication Classification

(76) Inventors: **Bing Chiang**, Melbourne, FL (US); **Douglas B. Kough**, San Jose, CA (US); **Enrique Ayala Vazquez**, Watsonville, CA (US); **Gregory A. Springer**, Sunnyvale, CA (US); **Hao Xu**, Cupertino, CA (US); **Robert W. Schlub**, Cupertino, CA (US); **Eduardo Lopez Camacho**, Watsonville, CA (US); **Mattia Pascolini**, Campbell, CA (US); **Jerzy Guterman**, Mountain View, CA (US); **Yi Jiang**, Cupertino, CA (US); **Rodney Andres Gomez Angulo**, Sunnyvale, CA (US); **Ruben Caballero**, San Jose, CA (US)

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 13/18 (2006.01)
H01Q 1/12 (2006.01)
H01Q 1/38 (2006.01)

(52) **U.S. Cl. 343/702; 343/770; 343/878; 343/700 MS**

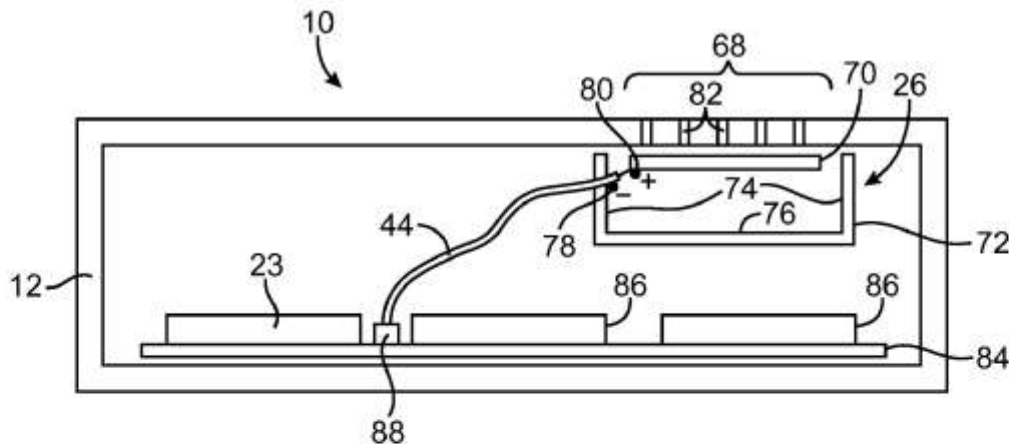
(57) **ABSTRACT**

Antennas are provided for electronic devices such as portable computers. An electronic device may have a housing in which an antenna is mounted. The housing may have an antenna window for the antenna. The antenna window may be formed from dielectric or from antenna window slots in a conductive member such as a conductive wall of the electronic device housing. An antenna may have an antenna resonating element that is backed by a conductive antenna cavity. The antenna resonating element may have antenna resonating element slots or may be formed using other antenna configurations such as inverted-F configurations. The antenna cavity may have conductive vertical sidewalls and a conductive rear wall. The antenna cavity walls may be formed from conductive layers on a dielectric antenna support structure.

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(21) Appl. No.: **12/500,570**





US 20110006954A1

(19) **United States**

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

(10) **Pub. No.:** US 2011/0006954 A1

(43) **Pub. Date:** Jan. 13, 2011

(54) **ANTENNA APPARATUS AND MOBILE TERMINAL HAVING THE SAME**

Publication Classification

(75) **Inventors:** Jae Min SEO, Gyeonggi-do (KR);
Hyun Soo KIM, Seoul (KR); Jae Sun PARK, Gyeonggi-do (KR)

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

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

Correspondence Address:
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(57) **ABSTRACT**

(73) **Assignee:** SAMSUNG ELECTRONICS CO., LTD., Gyeonggi-Do (KR)

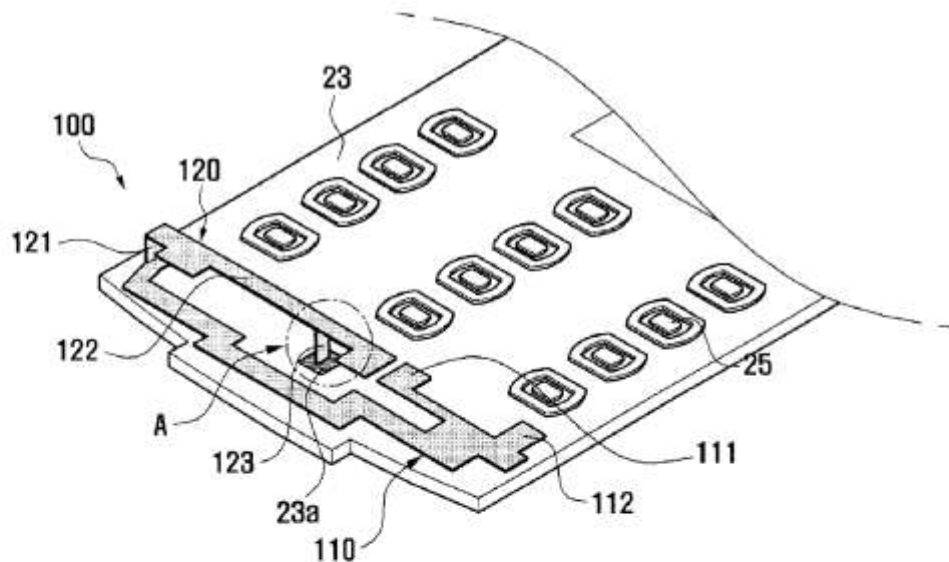
An antenna apparatus and a mobile terminal having the same are disclosed. The antenna apparatus includes: a first antenna portion patterned at one surface of the electronic circuit board; and a can type second antenna portion electrically connected to one end of the first antenna portion and separated from the one surface of the electronic circuit board, wherein one end of the second antenna portion is connected to the one end of the first antenna portion using a SMD method and the other end of the second antenna portion is connected to the one surface of the electronic circuit board using a SMD method through a floating pad formed in the one surface of the electronic circuit board.

(21) **Appl. No.:** 12/796,923

(22) **Filed:** Jun. 9, 2010

(30) **Foreign Application Priority Data**

Jul. 13, 2009 (KR) 10-2009-0063369





US 20110006955A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0006955 A1**

(43) **Pub. Date: Jan. 13, 2011**

(54) **HOUSING ANTENNA SYSTEM**

(86) PCT No.: **PCT/EP08/04337**

(75) Inventors: **Oliver Spiess, Bocholt (DE); Klaus Tueshaus, Rhede (DE)**

§ 371 (c)(1),
(2), (4) Date: **Jul. 7, 2010**

Publication Classification

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

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

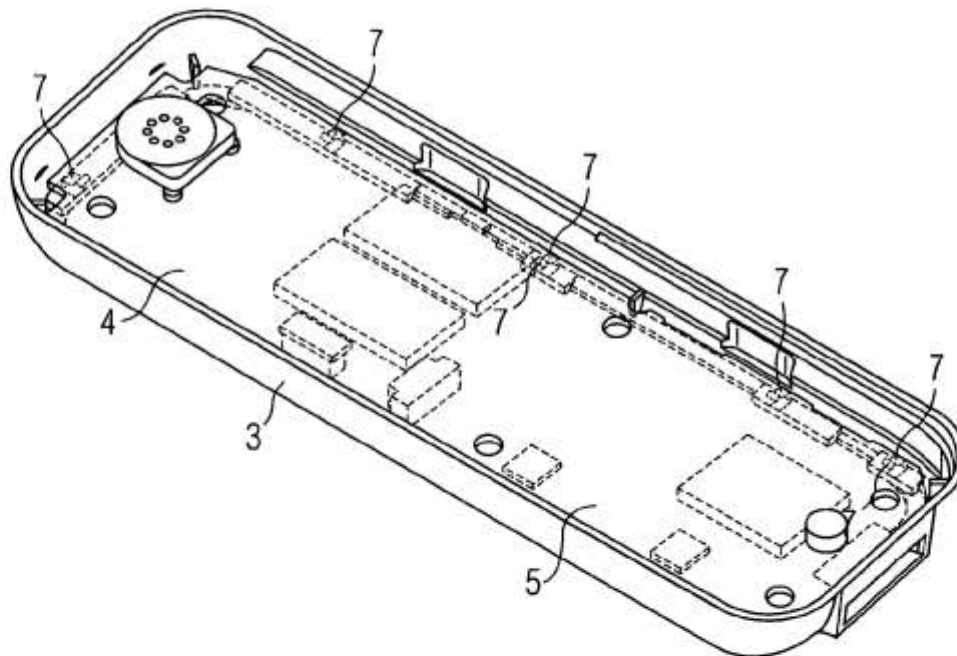
(57) **ABSTRACT**

(73) Assignee: **GIGASET COMMUNICATIONS GMBH, Muenchen (DE)**

A housing antenna system is proposed, by means of which automatic mass production of basic electrical or electronic devices having such a housing antenna system may be carried out in an economical and time-saving manner. This is achieved in that the housing antenna system is based on pressure contacting between the metallic antenna housing and the associated electronic circuit in order to operate the antenna housing as a housing antenna, using elastic elements.

(21) Appl. No.: **12/809,448**

(22) PCT Filed: **May 30, 2008**





US 20110006959A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0006959 A1**

(43) **Pub. Date: Jan. 13, 2011**

(54) **DUAL POLARIZED UHF ANTENNA**

Publication Classification

(76) Inventors: **Norbert Wilhelm Menko**,
Sprockhoevel (DE); **Stefan**
Mieslinger, Essenbach (DE);
Michael Koher, Bruckmuehl (DE)

(51) **Int. Cl.**
H01Q 21/00 (2006.01)
H01P 11/00 (2006.01)
H01Q 1/00 (2006.01)
(52) **U.S. Cl.** **343/728; 29/600; 343/729; 29/601**

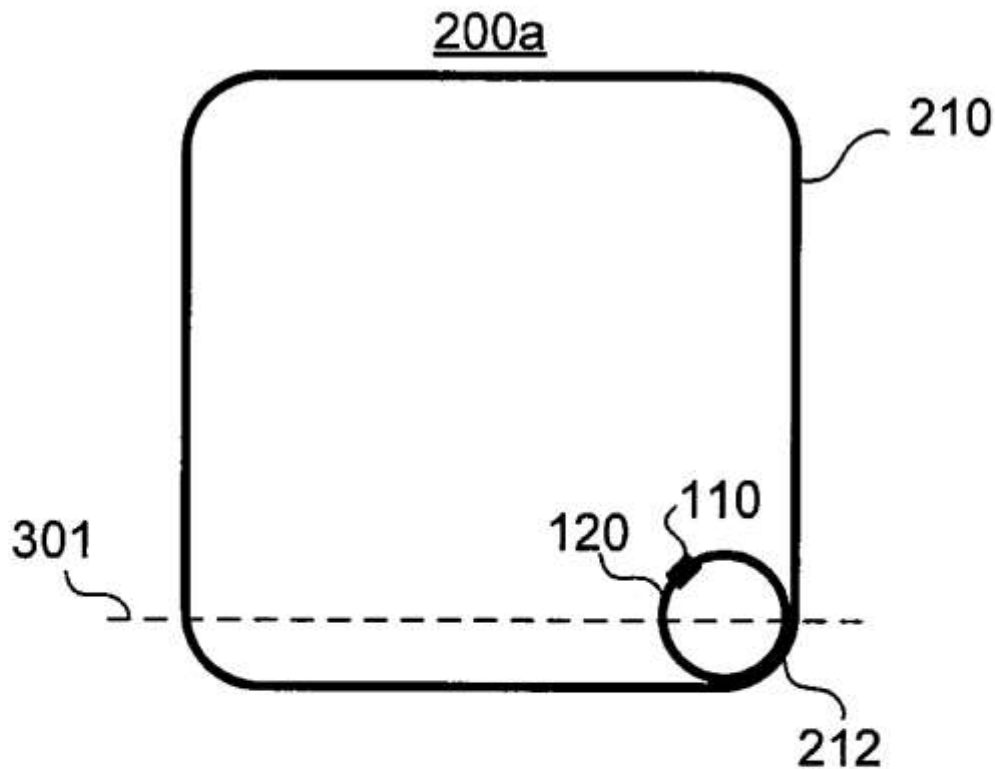
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(57) **ABSTRACT**

Described are antenna assemblies and methods for forming antenna assemblies. An antenna assembly includes a dual polarized far-field antenna and a near-field loop antenna. The near-field loop antenna is electromagnetically coupled to the dual polarized far-field antenna. The near-field loop antenna includes two contacts for electrically connecting to a chip.

(21) Appl. No.: **12/500,363**

(22) Filed: **Jul. 9, 2009**





US 20110006963A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0006963 A1**

(43) **Pub. Date: Jan. 13, 2011**

(54) **ANTENNA ELEMENT**

(52) **U.S. CL.** 343/787; 343/700 MS

(75) **Inventors:** **Kazuya Tani, Osaka (JP); Yoshio Koyanagi, Kanagawa (JP); Toshiteru Hayashi, Kanagawa (JP)**

(57) **ABSTRACT**

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(73) **Assignee:** **PANASONIC CORPORATION,**
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(21) **Appl. No.:** **12/922,120**

(22) **PCT Filed:** **Dec. 24, 2008**

(86) **PCT No.:** **PCT/JP2008/003938**

§ 371 (c)(1),
(2), (4) **Date:** **Sep. 10, 2010**

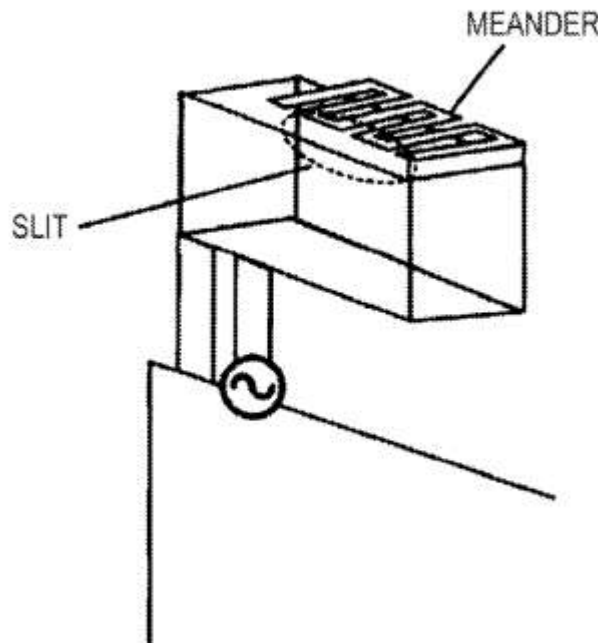
(30) **Foreign Application Priority Data**

Mar. 11, 2008 (JP) 2008-061307

Publication Classification

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

An antenna element includes: a first conductive plate which is approximately rectangular; a second conductive plate which shares one side of the first conductive plate in the width direction, which is placed substantially perpendicularly to the first conductive plate, and which is approximately rectangular; a third conductive plate which shares another side of the second conductive plate in the width direction, the other side being opposed to the one side shared with the first conductive plate, and which is placed perpendicularly to be opposed to the first conductive plate, and which is approximately rectangular; a fourth conductive plate which shares one sides of the first conductive plate, the second conductive plate, and the third conductive plate; a sixth conductive plate which extends from one side of the fourth conductive plate that does not share one sides of the first conductive plate, the second conductive plate, and the third conductive plate, and which is placed substantially perpendicularly to the fourth conductive plate; slits which are disposed respectively between the sixth conductive plate, and the first conductive plate and the third conductive plate; a short pin which connects the ground plate to the first conductive plate or the second conductive plate; and a feed pin which is connected to the first conductive plate or the second conductive plate in parallel to the short pin and in adjacent to the short pin.





US 20110011939A1

(19) **United States**

(12) **Patent Application Publication**
Seah

(10) **Pub. No.: US 2011/0011939 A1**

(43) **Pub. Date: Jan. 20, 2011**

(54) **CONTACT-LESS AND DUAL INTERFACE
INLAYS AND METHODS FOR PRODUCING
THE SAME**

Publication Classification

(51) **Int. Cl.**
G06K 19/067 (2006.01)
B32B 37/14 (2006.01)
(52) **U.S. Cl.** **235/492; 156/297; 156/73.1; 156/64**

(76) **Inventor: Linda Seah, Singapore (SG)**

(57) **ABSTRACT**

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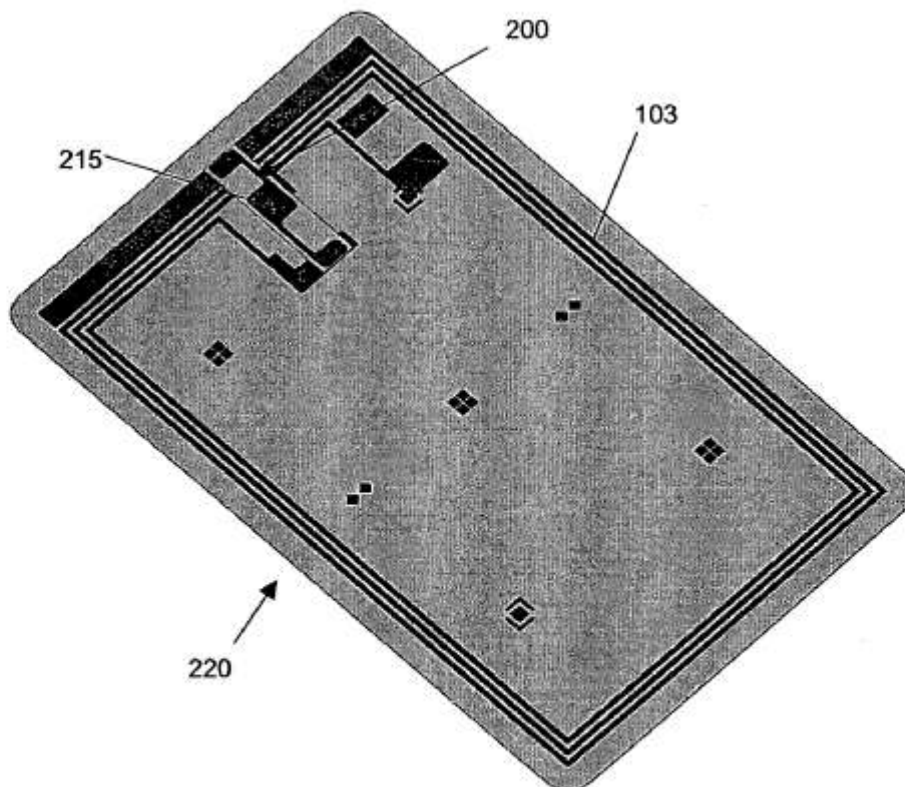
Embodiments of the present invention provide an inlay for use in multiple applications including a contact smart card, a contactless smart card, a ticket, a secured document, a combi smart card and a dual interface smart card. The inlay may include an inlay substrate; an antenna on the inlay substrate, the antenna having at least two terminal pads; and a polymer PCB bonded to and making an electrical connection between each of the terminal pads; wherein the terminal pads and polymer PCB are positioned to allow the inlay to be used in a desired smart card application, the application selected from a group consisting of a contact smart card, a contactless smart card, a ticket, a secured document, a combi smart card and a dual interface smart card; wherein, when the inlay is to be used in a contactless smart card, ticket, secured document or combi smart card, the polymer PCB functions as a carrier for a chip; and wherein, when the inlay is to be used in a dual interface or contact smart card, end portions of the polymer PCB function as strap leads to connect an embedded chip of the dual interface or contactless smart card to the antenna. One method for producing the inlays is also disclosed.

(21) **Appl. No.: 12/747,278**

(22) **PCT Filed: Dec. 19, 2007**

(86) **PCT No.: PCT/SG07/00434**

§ 371 (c)(1),
(2), (4) **Date: Sep. 8, 2010**





US 20110012789A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0012789 A1**

(43) **Pub. Date: Jan. 20, 2011**

(54) **MULTI-BAND ANTENNA**

(52) **U.S. CL.** 343/700 MS; 343/845

(76) **Inventors:** **Wen-Chieh Yang**, Taipei (TW);
Kai Shih, Taipei (TW); **Yu-Yuan Wu**, Taipei (TW)

(57) **ABSTRACT**

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A multi-band antenna has a ground portion, a first radiating portion defining opposite first and second ends, a L-shaped radiating portion connected to the second end of the first radiating portion and defining a third end extending towards the ground portion and a fourth end extending towards a direction, a stair-shaped radiating portion located between the ground portion and the L-shaped radiating portion and defining a fifth end connected to the first end of the first radiating portion and a sixth end extending towards the direction, and having at least one bent section, which has at least one bent section, a connecting portion interconnecting the bent section of the fourth radiating portion and the ground portion, and a feeding point arranged at the first end of the first radiating portion.

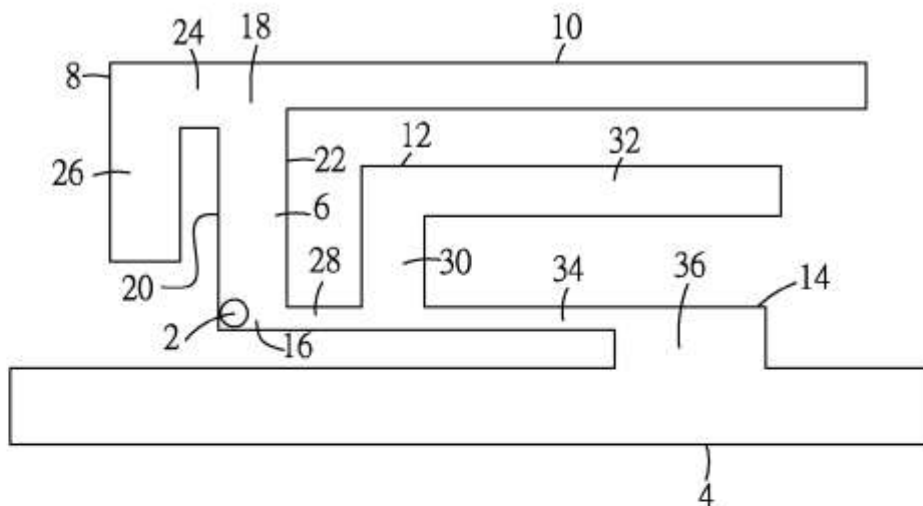
(21) **Appl. No.:** 12/505,469

(22) **Filed:** Jul. 18, 2009

Publication Classification

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

100





US 20110012790A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0012790 A1**

(43) **Pub. Date: Jan. 20, 2011**

(54) **MULTI-SLOT ANTENNA AND MOBILE DEVICE**

(75) **Inventors:** **Firass Mirza Badaruzzaman,**
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(21) **Appl. No.:** **12/835,601**

(22) **Filed:** **Jul. 13, 2010**

Related U.S. Application Data

(60) Provisional application No. 61/226,500, filed on Jul. 17, 2009.

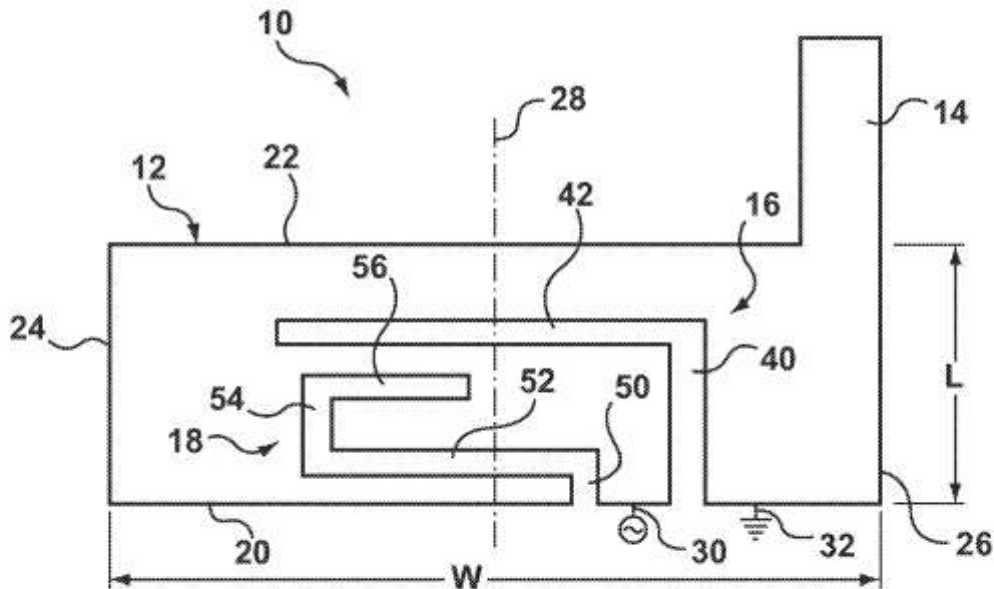
Publication Classification

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

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

(57) **ABSTRACT**

A mobile communications device having a patch antenna which has defined therein at least two slots each having two or more parts. The at least two slots may include an L-shaped slot and a C-shaped slot, wherein the slots can be open or closed. The L-shaped slot may be an open-slot projecting into the patch antenna from the edge. Ground and signal connections may be at the edge of the patch on either side of the L-shaped slot. The C-shaped slot may be nested within the L-shaped slot.





US 20110012794A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0012794 A1**

(43) **Pub. Date: Jan. 20, 2011**

(54) **ELECTRONIC DEVICES WITH PARASITIC ANTENNA RESONATING ELEMENTS THAT REDUCE NEAR FIELD RADIATION**

(22) Filed: **Dec. 7, 2009**

Related U.S. Application Data

(60) Provisional application No. 61/226,684, filed on Jul. 17, 2009.

Publication Classification

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

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

(57) **ABSTRACT**

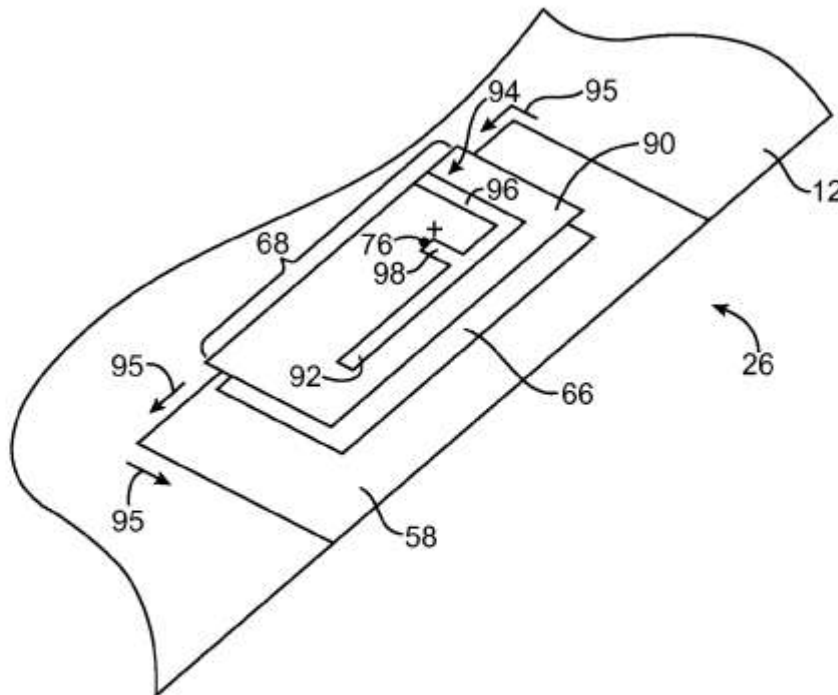
Antennas are provided for electronic devices such as portable computers. An electronic device may have a housing in which an antenna is mounted. The housing may be formed of conductive materials. A dielectric antenna window may be mounted in the housing to allow radio-frequency signals to be transmitted from the antenna and to allow the antenna to receive radio-frequency signals. Near-field radiation limits may be satisfied by reducing transmit power when an external object is detected in the vicinity of the dielectric antenna window and the antenna. A proximity sensor may be used in detecting external objects. A parasitic antenna resonating element may be interposed between the antenna resonating element and the dielectric antenna window to minimize near-field radiation hotspots. The parasitic antenna resonating element may be formed using a capacitor electrode for the proximity sensor. A ferrite layer may be interposed between the parasitic element and the antenna window.

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(21) Appl. No.: **12/632,697**





US 20110012795A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0012795 A1**

(43) **Pub. Date: Jan. 20, 2011**

(54) **PORTABLE TERMINAL**

Publication Classification

(76) Inventors: **Young-Seok JIN**, Gyeonggi-Do (KR); **Chang-II KIM**, Gyeonggi-Do (KR)

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

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

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(57) **ABSTRACT**

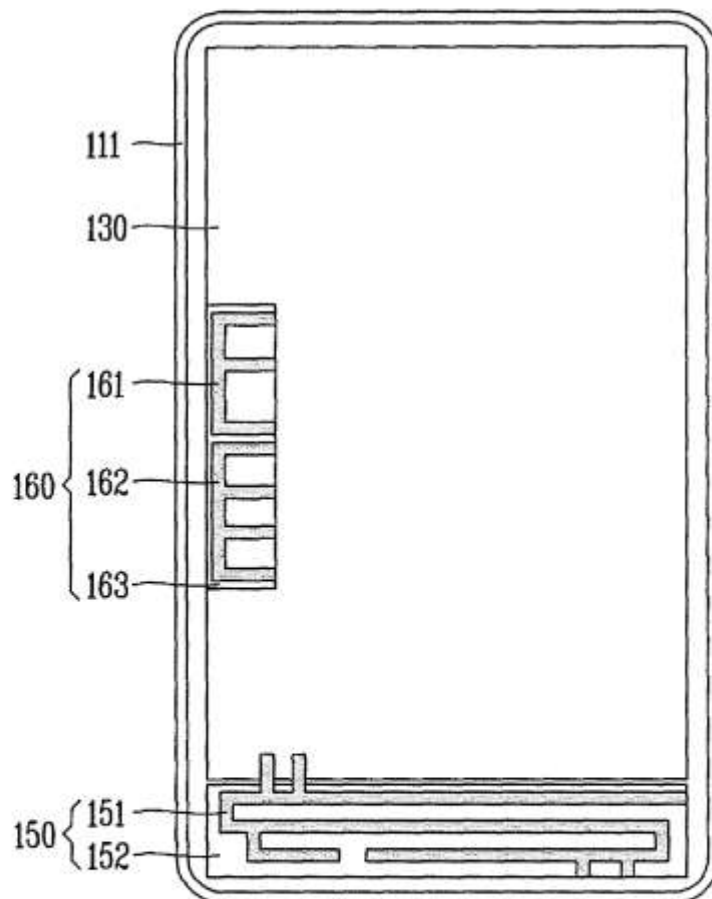
A portable terminal comprises: a terminal body having a receiver for sound output; a first antenna disposed in the terminal body, and operating at a first band; a second antenna disposed at a position different from the first antenna, and operating at a second band, wherein the second antenna comprises: a first conductor having a physical condition to be operable at the second band; and a second conductor having a physical condition to resonate an electromagnetic wave of the first band so as to reduce a field strength of the first band near the receiver.

(21) Appl. No.: **12/781,025**

(22) Filed: **May 17, 2010**

(30) **Foreign Application Priority Data**

Jul. 20, 2009 (KR) 10-2009-0066026





US 20110012800A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0012800 A1**

(43) **Pub. Date: Jan. 20, 2011**

(54) **ANTENNA WITH ACTIVE ELEMENTS**

(75) Inventors: **Jeff Shamblin**, San Marcos, CA (US); **Chulmin Han**, San Diego, CA (US); **Rowland Jones**, Carlsbad, CA (US); **Sebastian Rowson**, San Diego, CA (US); **Laurent Desclos**, San Diego, CA (US)

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

(21) Appl. No.: **12/894,052**

(22) Filed: **Sep. 29, 2010**

Related U.S. Application Data

(63) Continuation of application No. 11/841,207, filed on Aug. 20, 2007, now Pat. No. 7,830,320.

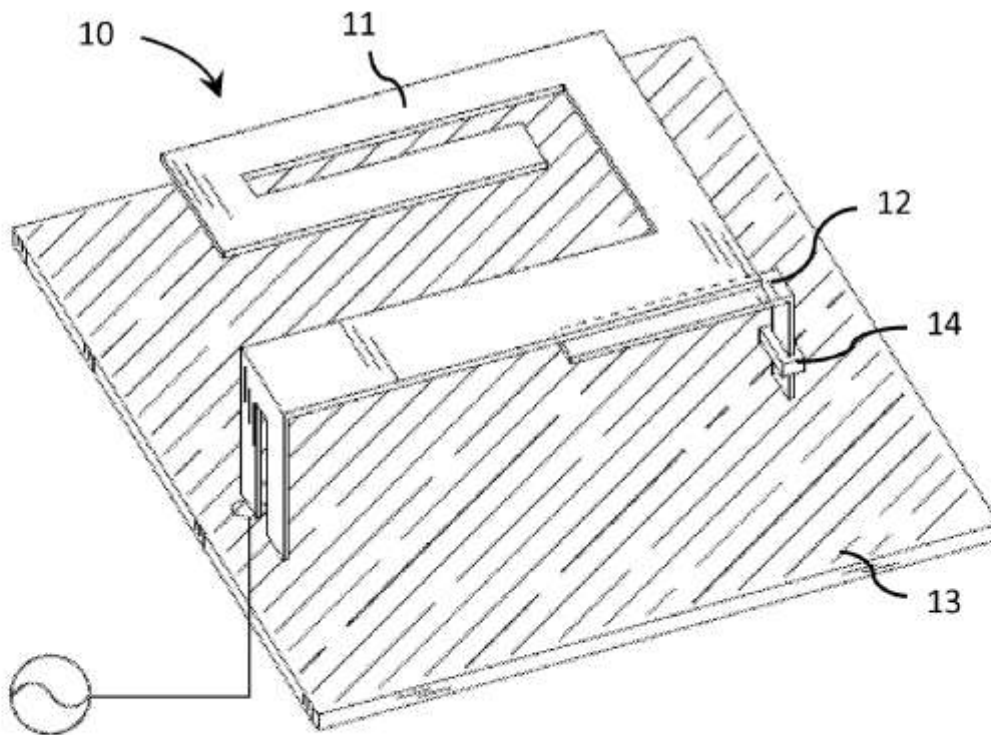
Publication Classification

(51) **Int. Cl.**
H01Q 13/16 (2006.01)
H01Q 23/00 (2006.01)

(52) **U.S. Cl.** **343/746**

(57) **ABSTRACT**

A multi-frequency antenna comprising an IMD element, one or more active tuning elements and one or more parasitic elements. The IMD element is used in combination with the active tuning and parasitic elements for enabling a variable frequency at which the antenna operates, wherein, when excited, the parasitic elements may couple with the IMD element to change an operating characteristic of the IMD element.





US 20110014958A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0014958 A1**

(43) **Pub. Date: Jan. 20, 2011**

(54) **SPLIT BAND DIVERSITY ANTENNA ARRANGEMENT**

Publication Classification

(75) **Inventors:** **Greg Black**, Vernon Hills, IL (US);
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Nicholas Matthew McDonnell, Schaumburg, IL (US);
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(51) **Int. Cl.**
H04M 1/00 (2006.01)

(52) **U.S. Cl.** **455/575.7**

(57) **ABSTRACT**

A wireless communication device or a split band diversity antenna arrangement (10, 20, 30 or 41) has a first multi-band antenna (22 or 14) located at a bottom portion (11) of the wireless communication device and selectively coupled to a diversity receiver (26), a second multi-band antenna (24 or 12) located at a top portion (13) of the wireless communication device and selectively coupled to a dual band transceiver (28), a band splitter (25) splitting an input from the first antenna into a first output and a second output where the first output serves as an input to the diversity receiver, and a band combiner (27) that combines the second output of the band splitter with a signal from the second antenna to provide an input signal to the dual band transceiver.

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(73) **Assignee:** **MOTOROLA, INC.**, Schaumburg, IL (US)

(21) **Appl. No.:** **12/505,040**

(22) **Filed:** **Jul. 17, 2009**

