US 20120013510A1

(19) **United States**

(12) **Patent Application Publication**

Yagi et al.

(10) **Pub. No.: US 2012/0013510 A1**

(43) **Pub. Date: Jan. 19, 2012**

(54) **MULTIBAND ANTENNA AND ELECTRONIC DEVICE**

(75) Inventors: **Shigeru Yagi**, Tokyo (JP); **Yuki Kotaka**, Tokyo (JP)

(73) Assignee: **Casio Computer Co., Ltd.**, Tokyo (JP)

(21) Appl. No.: **13/259,801**

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

(86) PCT No.: **PCT/JP2010/054644**

§ 371 (c)(1),
(2), (4) Date: **Sep. 23, 2011**

(30) **Foreign Application Priority Data**

Mar. 24, 2009 (JP) 2009-072081
Nov. 24, 2009 (JP) 2009-266118
Mar. 12, 2010 (JP) 2010-055201

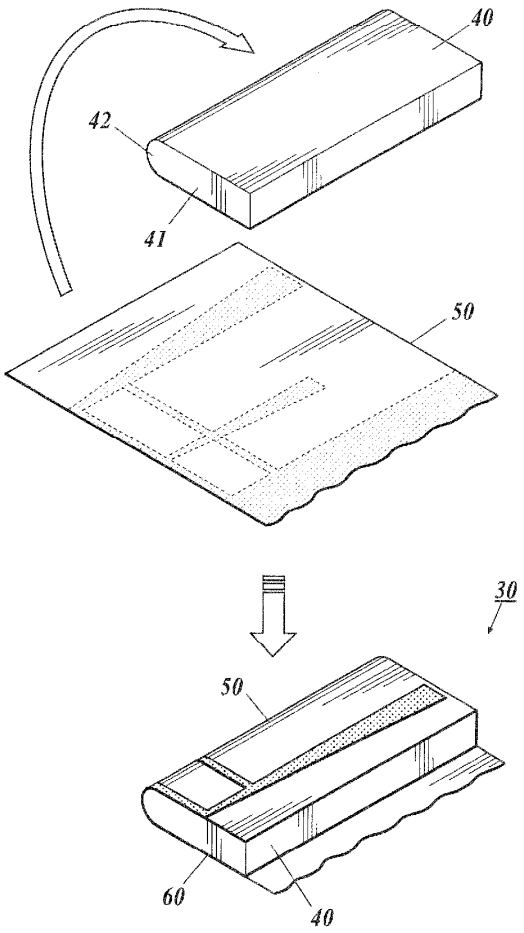
Publication Classification

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

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

(57) **ABSTRACT**

A multiband antenna includes a conductive antenna element portion and a conductive ground element portion which are provided on an insulating film. The antenna element portion includes a first antenna element having a length corresponding to a first resonance frequency, and a second antenna element having a length corresponding to a second resonance frequency. The ground element portion includes a first side having a length to resonate at the first resonance frequency, and a second side having a length to resonate at the second resonance frequency.



US 20120013518A1

(19) **United States**

(12) **Patent Application Publication**

Konishi

(10) **Pub. No.: US 2012/0013518 A1**

(43) **Pub. Date: Jan. 19, 2012**

(54) **ANTENNA UNIT AND ELECTRONIC APPARATUS**

(75) Inventor: **Michihiro Konishi**, Kawasaki (JP)

(73) Assignee: **Fujitsu Limited**, Kawasaki (JP)

(21) Appl. No.: **13/137,986**

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

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2009/056250, filed on Mar. 27, 2009.

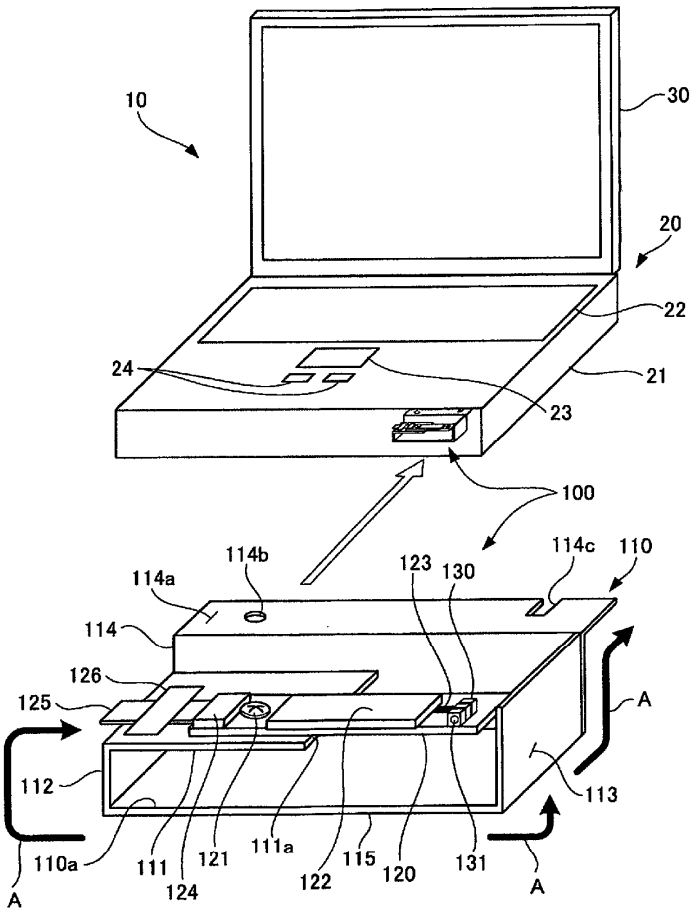
Publication Classification

(51) **Int. Cl.**
H01Q 1/42 (2006.01)

(52) **U.S. Cl.** **343/789**

(57) **ABSTRACT**

An antenna unit includes a housing, a substrate, and an antenna. The housing includes a bottom wall, first and second side walls extending upward from the corresponding side edges of the bottom wall, a rear wall extending upward from the rear edge of the bottom wall, and an upper wall extending from the upper edge of the first side wall toward the second side wall leaving a gap between an edge of the upper wall and the second side wall. The substrate is fixed to the upper wall, and a part of the substrate projects from the edge of the upper wall to a position that is closer to the second side wall than is the edge of the upper wall. The antenna is fixed to the part of the substrate projecting from the edge of the upper wall such that a radio-wave emitting aperture of the antenna faces forward.



US 20120013519A1

(19) **United States**

(12) **Patent Application Publication**

Håkansson et al.

(10) **Pub. No.: US 2012/0013519 A1**

(43) **Pub. Date: Jan. 19, 2012**

(54) **MULTIPLE-INPUT MULTIPLE-OUTPUT (MIMO) MULTI-BAND ANTENNAS WITH A CONDUCTIVE NEUTRALIZATION LINE FOR SIGNAL DECOUPLING**

(75) Inventors: **Mikael Håkansson**, Lund (SE); **Zhinong Ying**, Lund (SE)

(73) Assignee: **Sony Ericsson Mobile Communications AB**

(21) Appl. No.: **12/837,018**

(22) Filed: **Jul. 15, 2010**

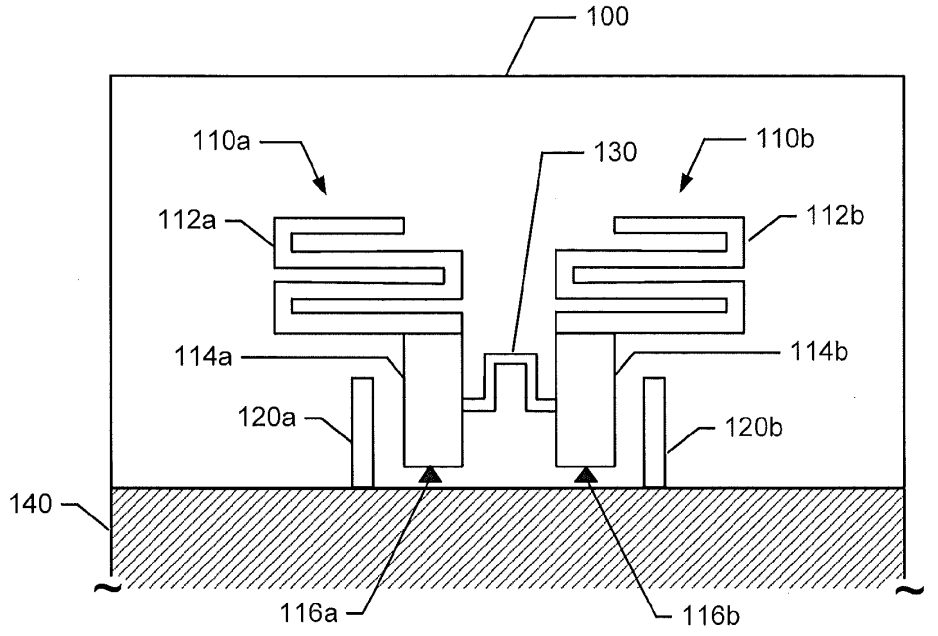
Publication Classification

(51) **Int. Cl.**
H01Q 19/10 (2006.01)
H01Q 9/04 (2006.01)

(52) **U.S. Cl.** ..... **343/835**; 343/700 MS

(57) **ABSTRACT**

A MIMO antenna includes first and second radiating elements, a conductive neutralization line, and first and second parasitic radiating elements. Each of the first and second radiating elements includes a straight portion connected to a serpentine portion. The straight and serpentine portions are configured to resonate in at least two spaced apart RF frequency ranges in response to the straight portion being electrically excited through a RF feed. The conductive neutralization line conducts resonant currents between the first and second radiating elements and has a conductive length that is configured to phase shift the conducted resonant currents to cause at least partial cancellation of currents in the first and second radiating elements which are generated by wireless RF signals received by the first and second radiating element from each other. The first parasitic radiating element can be adjacent and parasitically coupled to the first radiating element to radiate responsive to the first radiating element resonating at a RF frequency. The second parasitic radiating element can be adjacent and parasitically coupled to the second radiating element to radiate responsive to the second radiating element resonating at a RF frequency.



US 20120017427A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0017427 A1

(43) Pub. Date: Jan. 26, 2012

Lo et al.

(54) **METHOD FOR FORMING ANTENNA STRUCTURE**

(75) Inventors: **Wen-Kuei Lo**, Hsinchu (TW); **Sheng-Chieh Chang**, Hsinchu (TW); **Bau-Yi Huang**, Hsinchu (TW); **Chi-Wen Tsai**, Hsinchu (TW); **Hsin-Hui Hsu**, Hsinchu (TW); **Tzuh-Suan Wang**, Hsinchu (TW)

(73) Assignee: **WISTRON NEWEB CORP.**, Hsinchu (TW)

(21) Appl. No.: **12/969,516**

(22) Filed: **Dec. 15, 2010**

(30) **Foreign Application Priority Data**

Jul. 26, 2010 (TW) TW99124483

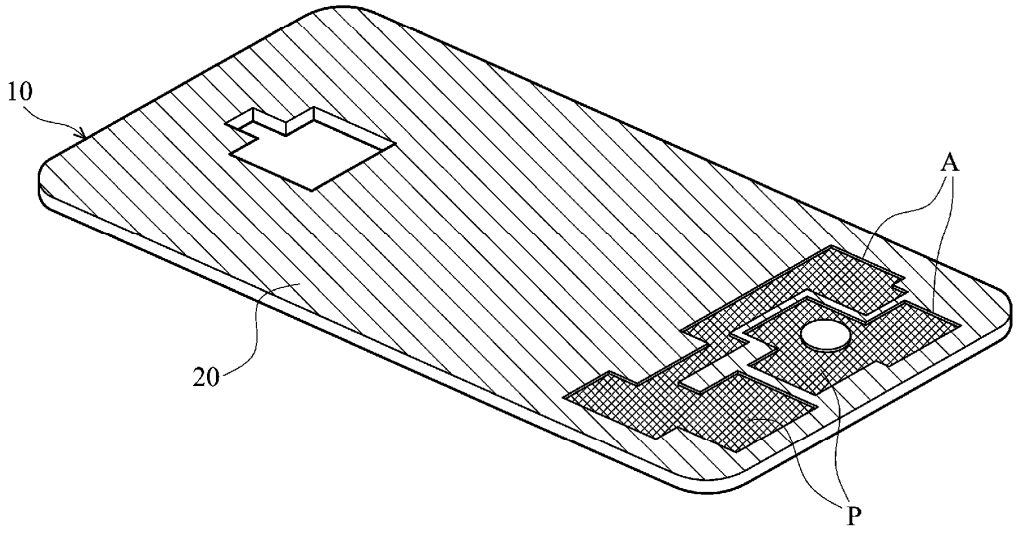
Publication Classification

(51) **Int. Cl.**
H01P 11/00 (2006.01)

(52) **U.S. Cl.** **29/600**

(57) **ABSTRACT**

A method for forming an antenna structure is provided, including the following steps of: providing a non-conductive frame and disposing a plating resist material on the non-conductive frame, removing a part of the plating resist material within a predetermined region on the non-conductive frame and forming a roughened surface on the non-conductive frame within the predetermined region by laser marking, forming a medium layer on the roughened surface, wherein the medium layer comprises Pd or Ag, removing the plating resist material on the non-conductive frame, and forming a metal layer on the medium layer.



US 20120019415A1

(19) **United States**

(12) **Patent Application Publication**

Tseng

(10) **Pub. No.: US 2012/0019415 A1**

(43) **Pub. Date: Jan. 26, 2012**

(54) **WIDEBAND ANTENNA**

(76) Inventor: **Kuan-Hsueh Tseng**, Hsinchu (TW)

(21) Appl. No.: **12/904,125**

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

(30) **Foreign Application Priority Data**

Jul. 22, 2010 (TW) 099124153

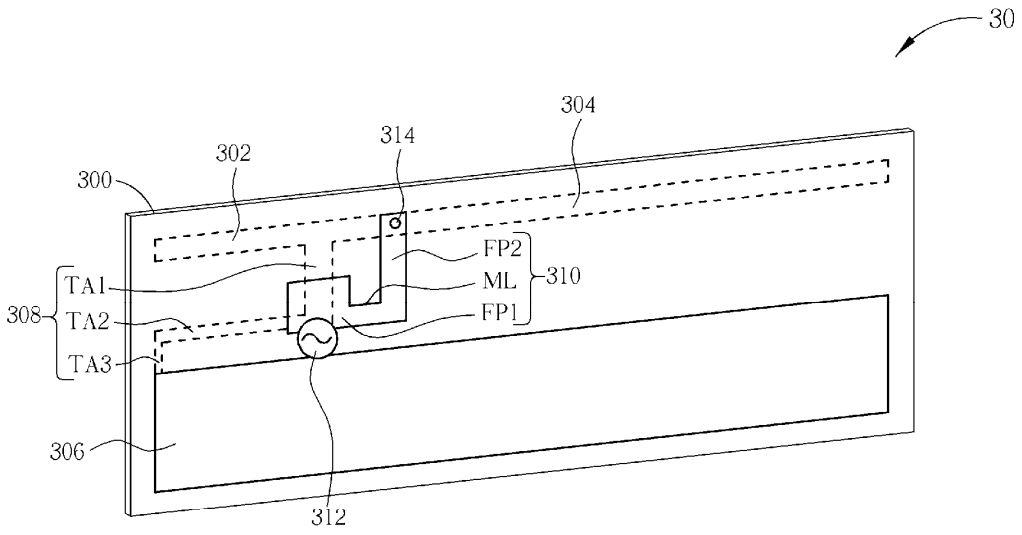
Publication Classification

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

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

(57) **ABSTRACT**

A wideband antenna for a radio transceiver device includes a first radiating element for transmitting and receiving wireless signals of a first frequency band, a second radiating element for transmitting and receiving wireless signals of a second frequency band, a grounding unit, a shorting unit having one end electrically connected to the first radiating element and the second radiating element, and another end electrically connected to the grounding unit, and a feeding board including a first feeding metal plane for transmitting wireless signals of the first frequency band and the second frequency band, a second feeding metal plane electrically connected to the second radiating element, and a metal strip electrically connected between the first radiating element and the second radiating element.



US 20120019416A1

(19) **United States**

(12) **Patent Application Publication**

Gala Gala et al.

(10) **Pub. No.: US 2012/0019416 A1**

(43) **Pub. Date: Jan. 26, 2012**

(54) **MULTIBAND ANTENNA FOR HANDHELD TERMINAL**

(76) Inventors: **David Gala Gala**, San Cugat Del Valles (ES); **Carles Puente Baliarda**, San Cugat Del Valles (ES); **Jordi Soler Castany**, San Cugat Del Valles (ES)

(21) Appl. No.: **13/011,160**

(22) Filed: **Jan. 21, 2011**

Related U.S. Application Data

(63) Continuation of application No. 12/316,460, filed on Dec. 12, 2008, now Pat. No. 7,903,037, which is a continuation of application No. 11/021,597, filed on Dec. 23, 2004, now Pat. No. 7,486,242, which is a continuation of application No. PCT/EP02/07002, filed on Jun. 25, 2002.

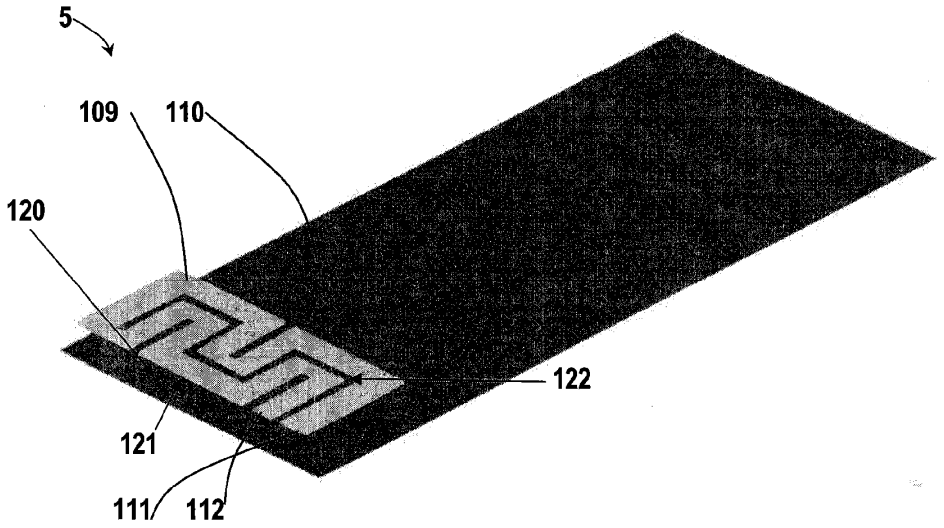
Publication Classification

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

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

(57) **ABSTRACT**

A multiband antenna includes a first conducting layer and a second conducting layer. The first conducting layer acts as a radiating element being placed over the second conducting layer while the second conducting layer acts as a ground plane. The first conducting layer includes a feeding point, the feeding point being a starting point for a first shorter arm and a second longer arm, the first and second arms forming a multilevel structure for the multiband antenna.



US 20120019418A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0019418 A1

(43) Pub. Date: Jan. 26, 2012

Wong et al.

(54) **MOBILE WIRELESS COMMUNICATIONS DEVICE WITH ELECTRICALLY CONDUCTIVE CONTINUOUS RING AND RELATED METHODS**

(75) Inventors: **Joshua Kwan Ho Wong**, Waterloo (CA); **John Alfred Whitmore**, Waterloo (CA); **Adrian Matthew Cooke**, Waterloo (CA); **Steven Eugene Downs**, Irving, TX (US); **Jari Kristian van Wonterghem**, Ottawa (CA)

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

(21) Appl. No.: **13/099,025**

(22) Filed: **May 2, 2011**

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/005,311, filed on Jan. 12, 2011.

(60) Provisional application No. 61/367,113, filed on Jul. 23, 2010.

Publication Classification

(51) **Int. Cl.**

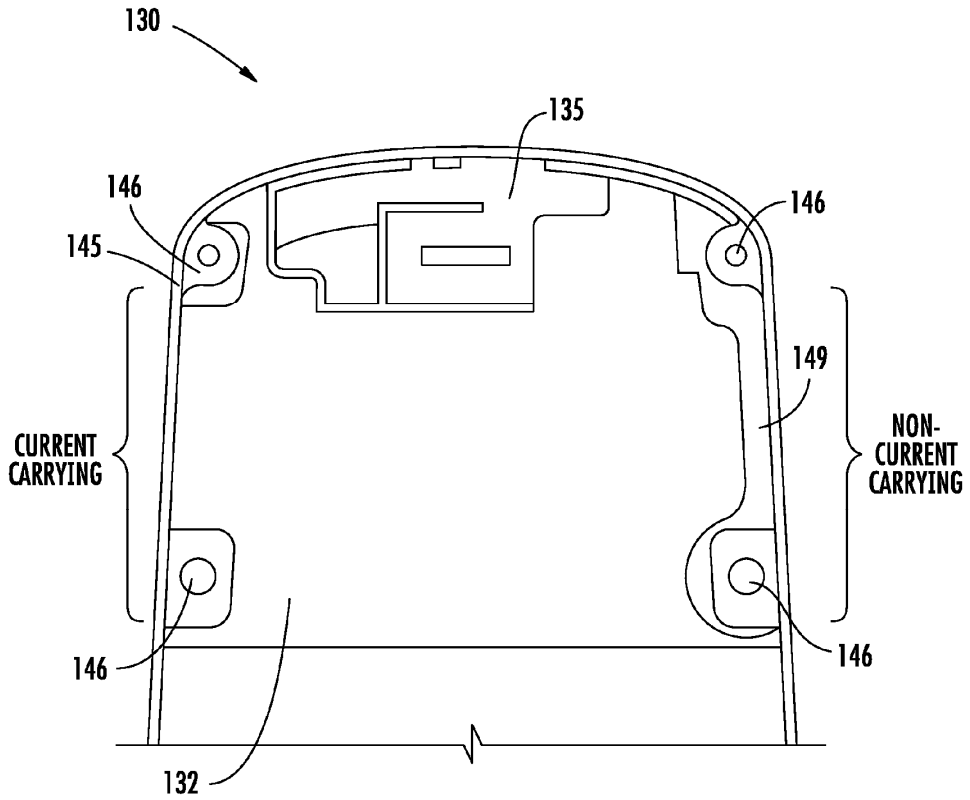
H01Q 1/24 (2006.01)

H01P 11/00 (2006.01)

(52) **U.S. Cl.** **343/702**; 29/601

(57) **ABSTRACT**

A mobile wireless communications device may include a portable housing that may include an electrically conductive continuous ring defining a perimeter of the portable housing. The electrically conductive continuous ring may be configured to function as an antenna. The mobile wireless communications device may further include a printed circuit board (PCB) carried by the portable housing and may include an electrically conductive layer defining a ground plane. The mobile wireless communications device may further include wireless transceiver circuitry carried by the PCB and coupled to the antenna. The mobile wireless communications device may also include an electrically conductive shorting member coupled between the electrically conductive continuous ring and the ground plane.



US 20120019419A1

(19) **United States**

(12) **Patent Application Publication**

Prat et al.

(10) **Pub. No.: US 2012/0019419 A1**

(43) **Pub. Date: Jan. 26, 2012**

(54) **FLAT SCREEN WITH INTEGRATED ANTENNA**

(76) Inventors: **Christophe Prat**, Coueron (FR); **Lionel Rudant**, Grenoble (FR)

(21) Appl. No.: **13/143,589**

(22) PCT Filed: **Dec. 18, 2009**

(86) PCT No.: **PCT/FR2009/001461**

§ 371 (c)(1), (2), (4) Date: **Oct. 6, 2011**

(30) **Foreign Application Priority Data**

Jan. 7, 2009 (FR) 0900036

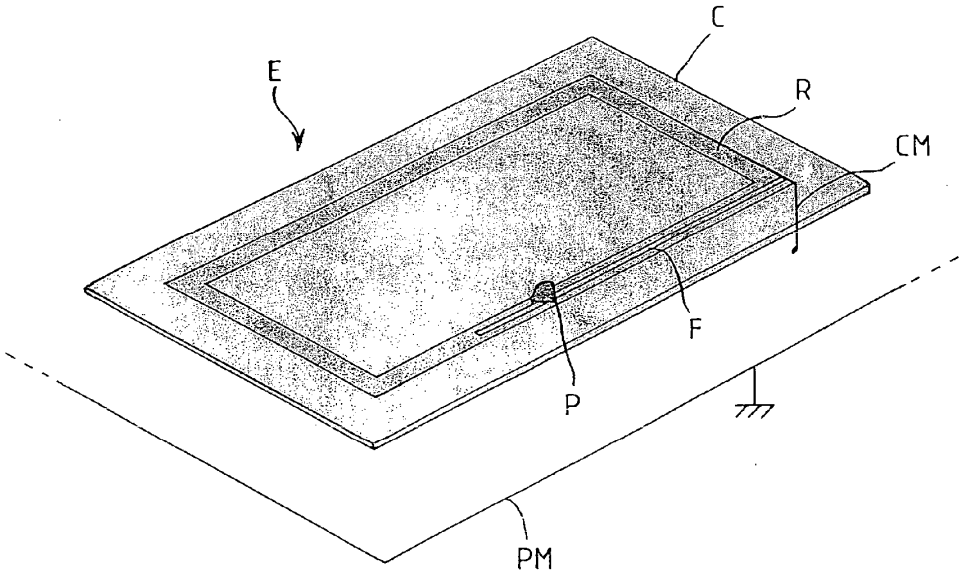
Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 1/44 (2006.01)

(52) **U.S. Cl.** **343/702**; 343/720

(57) **ABSTRACT**

The invention relates to a flat screen (E) that comprises an active pixel matrix (M), an electrode that is common to said pixels (C), and a conductive strip (R) preferably in the form of a ring that is connected to said common electrode and at least partially surrounds said active matrix, characterised in that at least one slot (F) defining an antenna is formed in said conducting strip. The invention also relates to a portable apparatus that comprises: such a flat screen (E); an electronic board including a floorplan (PM) parallel to the flat screen and electrically connected to the conductive strip of the same; a means for generating and/or detecting electric radiofrequency signals; and an excitation port (P) for the slot antenna (F) installed in the flat screen, and connected to said means for generating and/or detecting electric radiofrequency signals.



US 20120019420A1

(19) **United States**

(12) **Patent Application Publication**

Caimi et al.

(10) **Pub. No.: US 2012/0019420 A1**

(43) **Pub. Date: Jan. 26, 2012**

(54) **METHODS AND APPARATUSES FOR ADAPTIVELY CONTROLLING ANTENNA PARAMETERS TO ENHANCE EFFICIENCY AND MAINTAIN ANTENNA SIZE COMPACTNESS**

(76) Inventors: **Frank M. Caimi**, Vero Beach, FL (US); **Gregory A. O'Neill, JR.**, Rockledge, FL (US); **Ping Chen**, Greensboro, NC (US); **Young-Min Jo**, Viera, FL (US)

(21) Appl. No.: **13/209,707**

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

Related U.S. Application Data

(63) Continuation of application No. 11/623,307, filed on Jan. 15, 2007, now Pat. No. 8,000,737, which is a continuation-in-part of application No. 11/421,878, filed on Jun. 2, 2006, now Pat. No. 7,834,813, which is a continuation-in-part of application No. 11/252,248, filed on Oct. 17, 2005, now Pat. No. 7,663,555.

(60) Provisional application No. 60/619,231, filed on Oct. 15, 2004.

Publication Classification

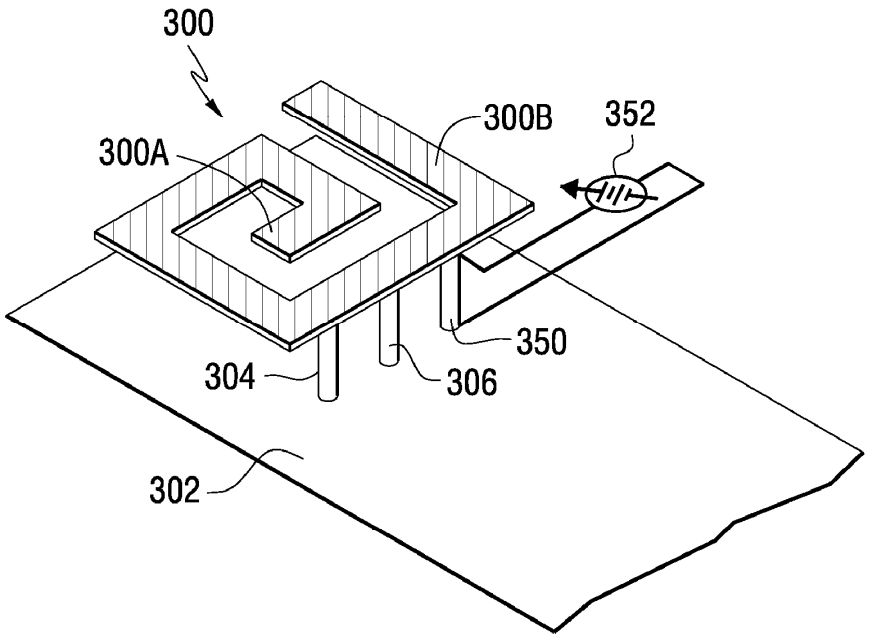
(51) **Int. Cl.**

H01Q 1/50	(2006.01)
H01P 11/00	(2006.01)
H01Q 1/24	(2006.01)

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

(57) **ABSTRACT**

A modular communications apparatus. The apparatus comprises a dielectric substrate, a radiating structure disposed on a surface of the substrate, and an electronics module disposed within the dielectric substrate. The electronics module comprises a power amplifier and signal receiving components. The apparatus further comprises fixed length transmission lines connecting the radiating structure and the electronics module, a length of each transmission line selected to present a desired impedance at an input and an output terminal of each transmission line without requiring separate impedance matching elements.



US 20120019421A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0019421 A1

(43) Pub. Date: Jan. 26, 2012

Lai et al.

(54) **MOBILE WIRELESS DEVICE WITH MULTI-BAND LOOP ANTENNA WITH ARMS DEFINING A SLOTTED OPENING AND RELATED METHODS**

(75) Inventors: **Chun Kit Lai**, Sunrise, FL (US); **Soo Liam Ooi**, Sunrise, FL (US); **Qiwu Tan**, Sunrise, FL (US)

(73) Assignees: **Ontario, Canada)**, Waterloo (CA); **Research In Motion Limited (a corporation organized under the laws of the Province of**

(21) Appl. No.: **13/005,326**

(22) Filed: **Jan. 12, 2011**

Related U.S. Application Data

(60) Provisional application No. 61/367,083, filed on Jul. 23, 2010.

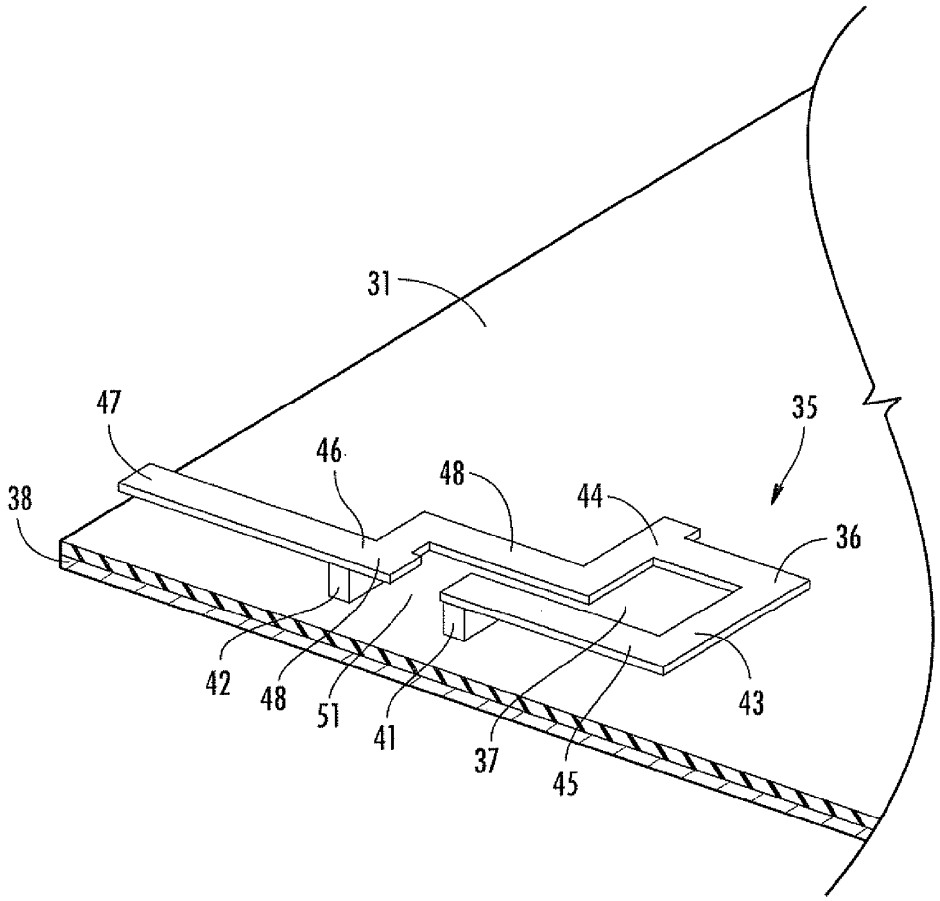
Publication Classification

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

(52) **U.S. Cl.** **343/729**

(57) **ABSTRACT**

A mobile wireless communications device may include a housing, a printed circuit board (PCB) carried by the housing. The device may also include an antenna coupled to wireless transceiver circuitry carried by the PCB. The antenna may include first and second feed legs extending upwardly from the PCB, a loop conductor spaced above the PCB and having a gap therein defining first and second ends, and a first conductor arm spaced above the PCB and extending between the first feed leg and the first end. The antenna may further include a second conductor arm spaced above the PCB and having a proximal portion between the second feed leg and the second end, and having a distal portion extending outwardly from the second feed leg. The first conductor arm and the proximal portion may define a slotted opening into an interior of the loop conductor.



US 20120019429A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0019429 A1

(43) Pub. Date: Jan. 26, 2012

Chiu et al.

(54) **PIVOTAL WIRELESS TRANSMISSION DEVICE**

(75) Inventors: **Tsung-Wen Chiu**, Taipei County (TW); **Fu Ren Hsiao**, Taipei County (TW)

(73) Assignee: **ADVANCED CONNECTEK, INC.**, Taipei County (TW)

(21) Appl. No.: **12/972,935**

(22) Filed: **Dec. 20, 2010**

(30) **Foreign Application Priority Data**

Jul. 23, 2010 (TW) 099124290

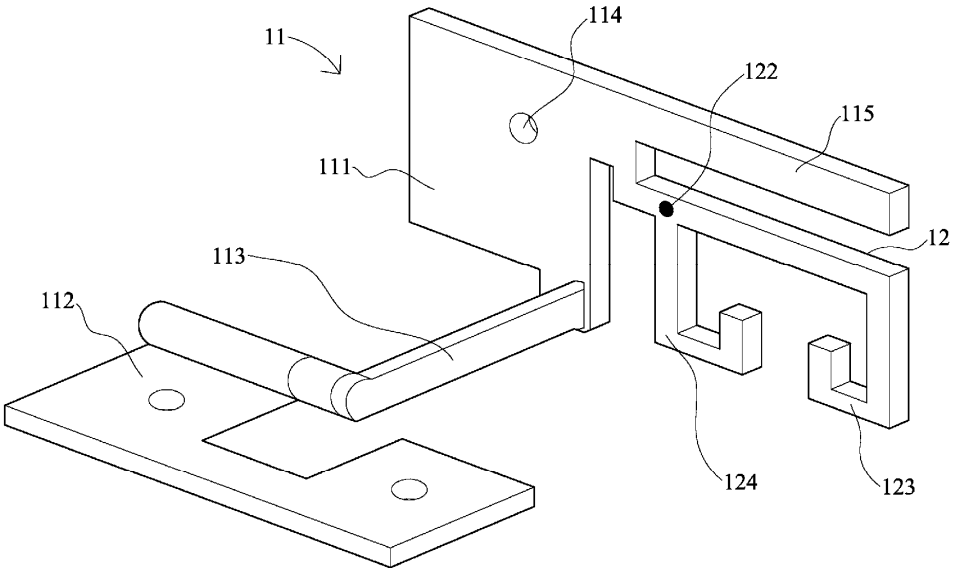
Publication Classification

(51) **Int. Cl.**
H01Q 3/02 (2006.01)

(52) **U.S. Cl.** **343/882**

(57) **ABSTRACT**

A pivotal wireless transmission device comprises a fixing device having a first plane, a second plane and a coupling member coupling the first plane and the second plane; and a radiation conductor having a conduction path extending from one side of the first plane and a feeder point arranged in the conduction path. The present invention enables the radiation conductor to be securely fixed to a display frame. The present invention uses the first plane as the ground plane of the radiation conductor. Thus, both the first plane and the second plane function as the ground planes of the antenna system. Thereby is increased the transmission efficiency of radiation signals.



US 20120019730A1

(19) **United States**

(12) **Patent Application Publication**

Suzuki et al.

(10) **Pub. No.: US 2012/0019730 A1**

(43) **Pub. Date: Jan. 26, 2012**

(54) **RECEIVER**

(75) Inventors: **Kazuaki Suzuki**, Kyoto (JP); **Keisuke Kinoshita**, Osaka (JP)

(73) Assignee: **Panasonic Corporation**, Osaka (JP)

(21) Appl. No.: **12/921,454**

(22) PCT Filed: **Dec. 3, 2009**

(86) PCT No.: **PCT/JP2009/006574**

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

(30) **Foreign Application Priority Data**

Feb. 18, 2009 (JP) 2009-034953

Publication Classification

(51) **Int. Cl.**

H01Q 1/24 (2006.01)

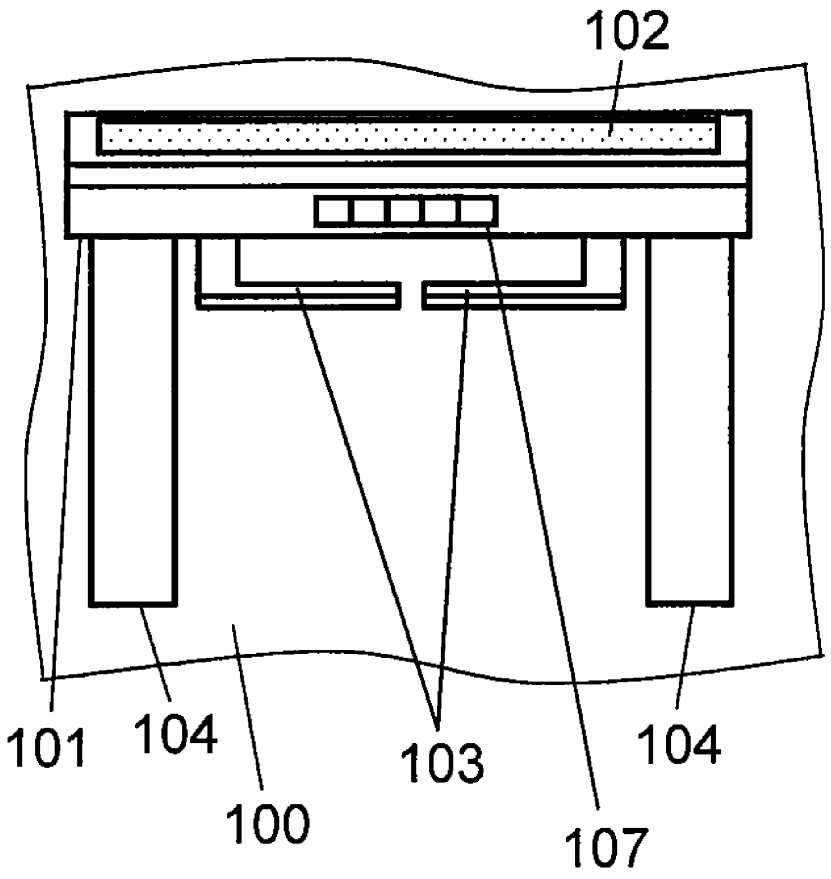
H04L 27/00 (2006.01)

H04N 5/44 (2011.01)

(52) **U.S. Cl.** ... **348/725**; 343/702; 375/316; 348/E05.096

(57) **ABSTRACT**

The receiver diversity-receives radio wave with a plurality of antennas. The receiver includes a conductive case having a receiving section for executing diversity-receiving processing, a first through hole and a second through hole that are disposed on the surface of the same side of the case and penetrate the case from the outside to the inside, a first antenna and a second antenna for supplying a received signal to the receiving section, and a first hinge and a second hinge that are fixed to the inside of the case, pass the first through hole and the second through hole, directly or indirectly support the first antenna and the second antenna, and are movable, respectively. A partition is disposed between the first through hole and the second through hole.



US 20120019731A1

(19) **United States**

(12) **Patent Application Publication**

Imai et al.

(10) **Pub. No.: US 2012/0019731 A1**

(43) **Pub. Date: Jan. 26, 2012**

(54) **TUNER MODULE AND RECEIVING DEVICE**

(75) Inventors: **Tadashi Imai**, Chiba (JP); **Makoto Watanabe**, Tokyo (JP); **Toshiyuki Sudo**, Tokyo (JP); **Toshiyuki Nagano**, Kanagawa (JP); **Mitsuru Ikeda**, Tokyo (JP); **Teruyuki Toyoda**, Tokyo (JP); **Hideaki Ozawa**, Chiba (JP); **Tomonori Nakajima**, Tokyo (JP); **Goujin Arakawa**, Kanagawa (JP); **Norio Uchida**, Kanagawa (JP); **Hiroyuki Takamatsu**, Kanagawa (JP)

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

(21) Appl. No.: **13/181,982**

(22) Filed: **Jul. 13, 2011**

(30) **Foreign Application Priority Data**

Jul. 22, 2010 (JP) 2010-165131

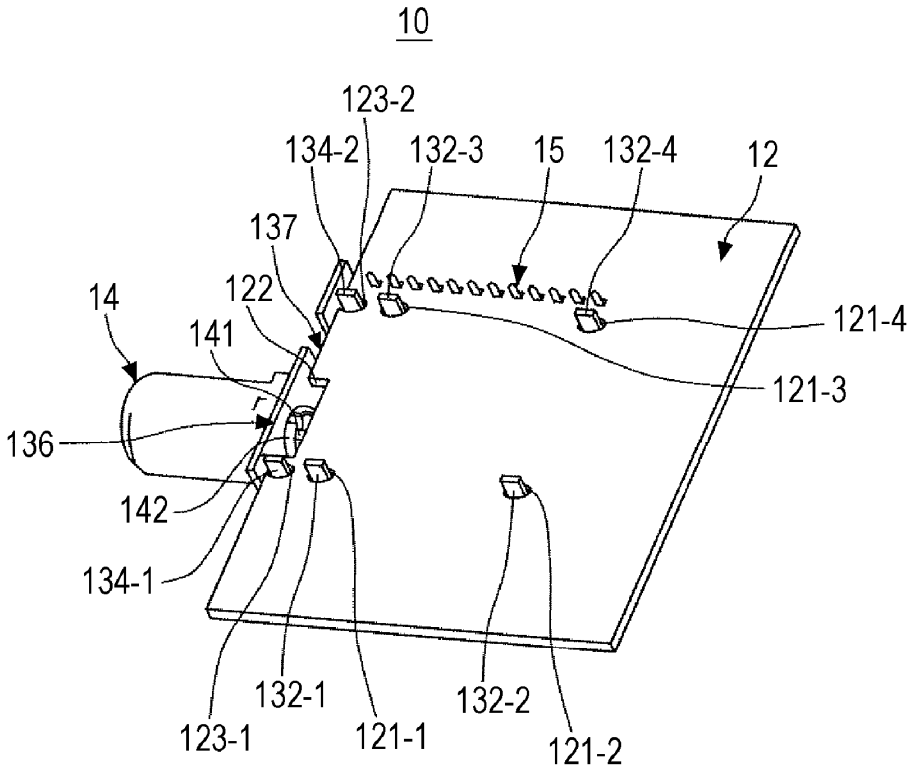
Publication Classification

(51) **Int. Cl.**
H04N 5/50 (2006.01)
H04N 5/455 (2006.01)

(52) **U.S. Cl.** **348/726**; 348/731; 348/E05.097; 348/E05.113

(57) **ABSTRACT**

A tuner module includes a tuner module substrate having a tuner function part formed thereon, a case body having a shielding function of holding and incorporating at least the tuner module substrate, a circuit board on which the tuner module substrate is mounted, and at least one antenna connector to be fixed to the case body and having a core wire connected to the tuner module substrate incorporated in the case body. A part of the circuit board is contained inside the case body.



US 20120021702A1

(19) **United States**

(12) **Patent Application Publication**

Liu et al.

(10) **Pub. No.: US 2012/0021702 A1**

(43) **Pub. Date: Jan. 26, 2012**

(54) **INTELLIGENT TRANSMISSION ANTENNA SELECTION METHOD AND COMMUNICATIONS APPARATUS UTILIZING THE SAME**

(75) Inventors: **Yi-Chang Liu**, Dayuan Township (TW); **Shun-An Yang**, Baoshan Township (TW)

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

(21) Appl. No.: **13/188,086**

(22) Filed: **Jul. 21, 2011**

Related U.S. Application Data

(60) Provisional application No. 61/367,732, filed on Jul. 26, 2010.

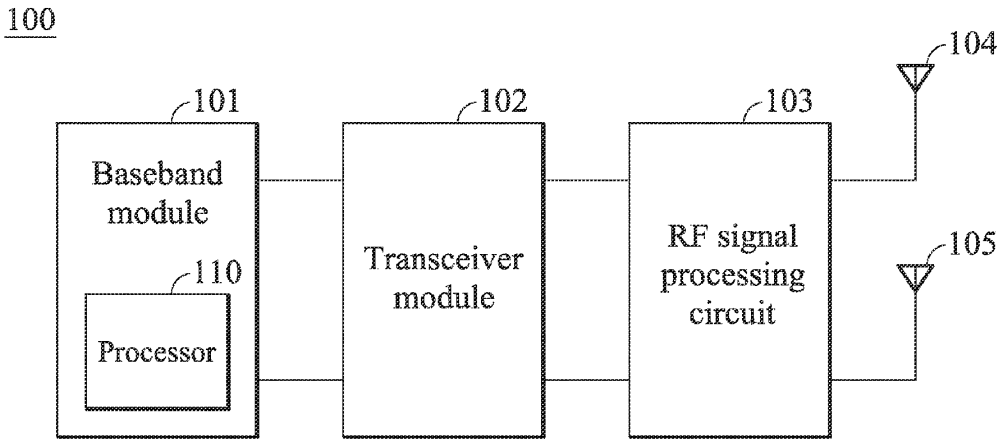
Publication Classification

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

(52) **U.S. Cl.** **455/90.2**

(57) **ABSTRACT**

A communications apparatus. Multiple antennas are arranged to receive downlink signals and transmit uplink signals. A transceiver module is arranged to receive the downlink signals from the antennas and pass the uplink signals to an antenna selection device. The antenna selection device is coupled between the antennas and the transceiver module and arranged to receive the uplink signals to be transmitted from the transceiver module and dynamically pass the uplink signals to one of the antennas according to an antenna selection signal. A processor is arranged to receive the downlink signals from the transceiver module, calculate short-term signal qualities of the downlink signals and generate the antenna selection signal according to the short-term signal qualities.



US 20120025939A1

(19) **United States**

(12) **Patent Application Publication**

YAMAGUCHI et al.

(10) **Pub. No.: US 2012/0025939 A1**

(43) **Pub. Date: Feb. 2, 2012**

(54) **ANTENNA DEVICE AND COMMUNICATION APPARATUS INCLUDING THE SAME**

(75) Inventors: **Shuichiro YAMAGUCHI**, Miyazaki (JP); **Kouichi NAKAMURA**, Miyazaki (JP); **Yasutaka HIEDA**, Miyazaki (JP)

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

(21) Appl. No.: **13/191,156**

(22) Filed: **Jul. 26, 2011**

(30) **Foreign Application Priority Data**

Jul. 28, 2010 (JP) 2010-168893
Dec. 20, 2010 (JP) 2010-282784

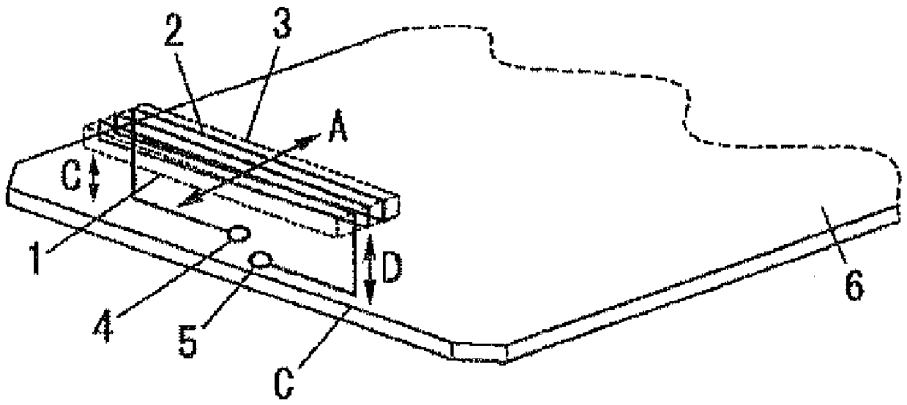
Publication Classification

(51) **Int. Cl.**
H01F 38/14 (2006.01)

(52) **U.S. Cl.** **336/105**; 336/115

(57) **ABSTRACT**

There is disclosed an antenna device including: a metal portion which has a surface; and a coil section which is provided above the surface of the metal portion and has an opening portion. Here, a surface of the coil section in which the opening portion is formed is approximately perpendicular to the surface of the metal portion, and the coil section is disposed in the vicinity of an edge of the metal portion.



US 20120026044A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0026044 A1

(43) Pub. Date: Feb. 2, 2012

Lo et al.

(54) **MODIFICATION ON MONOPOLE ANTENNA**

(75) Inventors: **Wen-Yuan Lo**, Jung-He City (TW); **Cheng-Hsu Yang**, Jung-He City (TW); **Yueh-Cheng Chen**, Jung-He City (TW)

(73) Assignee: **Micro-Star Int'l Co., Ltd.**, Jung-He City (TW)

(21) Appl. No.: **12/939,448**

(22) Filed: **Nov. 4, 2010**

(30) **Foreign Application Priority Data**

Jul. 28, 2010 (TW) 99214403

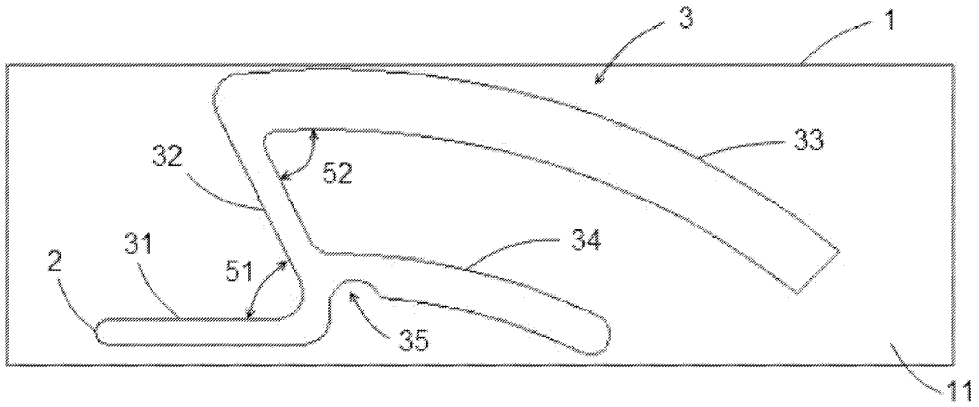
Publication Classification

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

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

(57) **ABSTRACT**

A monopole antenna is disposed on a substrate including a first surface and a second surface. The monopole antenna includes a feeding point, a radiation unit, and a reflecting element. The radiation unit is disposed on the first surface of the substrate, and includes a feeding section, a first radiation section, a second radiation section, and a third radiation section. The feeding section, the first radiation section, and the second radiation section are connected sequentially. The feeding point is electrically connected to the feeding section. The second radiation section and the feeding section are respectively placed at two sides of a longitudinal axis of the first radiation section. The third radiation section is electrically connected to the first radiation section. The reflecting element is disposed on the second surface of the substrate, and corresponds to a position of the second radiation section.



US 20120026045A1

(19) **United States**

(12) **Patent Application Publication**

Soler Castany et al.

(10) **Pub. No.: US 2012/0026045 A1**

(43) **Pub. Date: Feb. 2, 2012**

(54) **ANTENNA WITH ONE OR MORE HOLES**

(76) Inventors: **Jordi Soler Castany**, San Cugat del Valles (ES); **Carles Puente Baliarda**, San Cugat del Valles (ES)

(21) Appl. No.: **13/015,901**

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

Related U.S. Application Data

(63) Continuation of application No. 12/246,964, filed on Oct. 7, 2008, now Pat. No. 7,907,092, which is a continuation of application No. 11/036,509, filed on Jan. 12, 2005, now Pat. No. 7,471,246, which is a continuation of application No. PCT/EP02/07836, filed on Jul. 15, 2002.

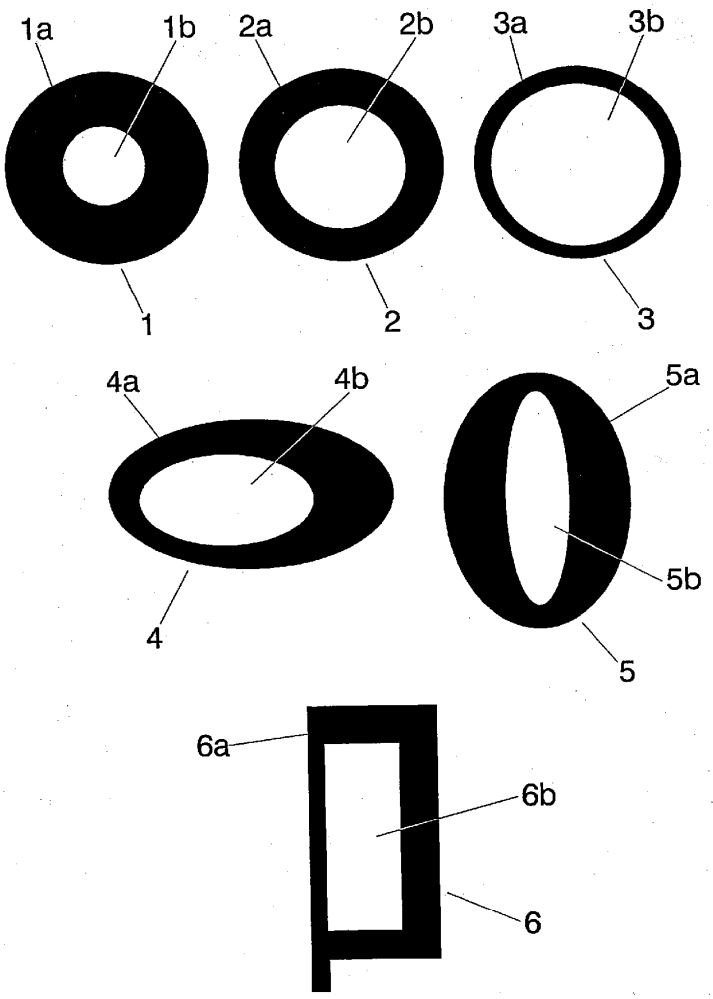
Publication Classification

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

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

(57) **ABSTRACT**

A new type of multihole antenna which is mainly suitable for mobile communications or in general to any other application where the integration of telecom systems or applications in a single antenna is important. The antenna includes a radiating element which at least includes one hole. By means of this configuration, the antenna provides a broadband and multiband performance, and hence it features a similar behaviour through different frequency bands. Also, the antenna features a smaller size with respect to other prior art antennas operating at the same frequency.



US 20120026046A1

(19) **United States**

(12) **Patent Application Publication**

BIT-BABIK et al.

(10) **Pub. No.: US 2012/0026046 A1**

(43) **Pub. Date: Feb. 2, 2012**

(54) **ANTENNA INTEGRATED WITH A PORTABLE COMMUNICATION DEVICE**

(75) Inventors: **GIORGI BIT-BABIK**, SUNRISE, FL (US); **JODY H. AKENS**, WESTON, FL (US); **THOMAS J. CHAPPELL**, COCONUT CREEK, FL (US)

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

(21) Appl. No.: **12/846,898**

(22) Filed: **Jul. 30, 2010**

Publication Classification

(51) **Int. Cl.**

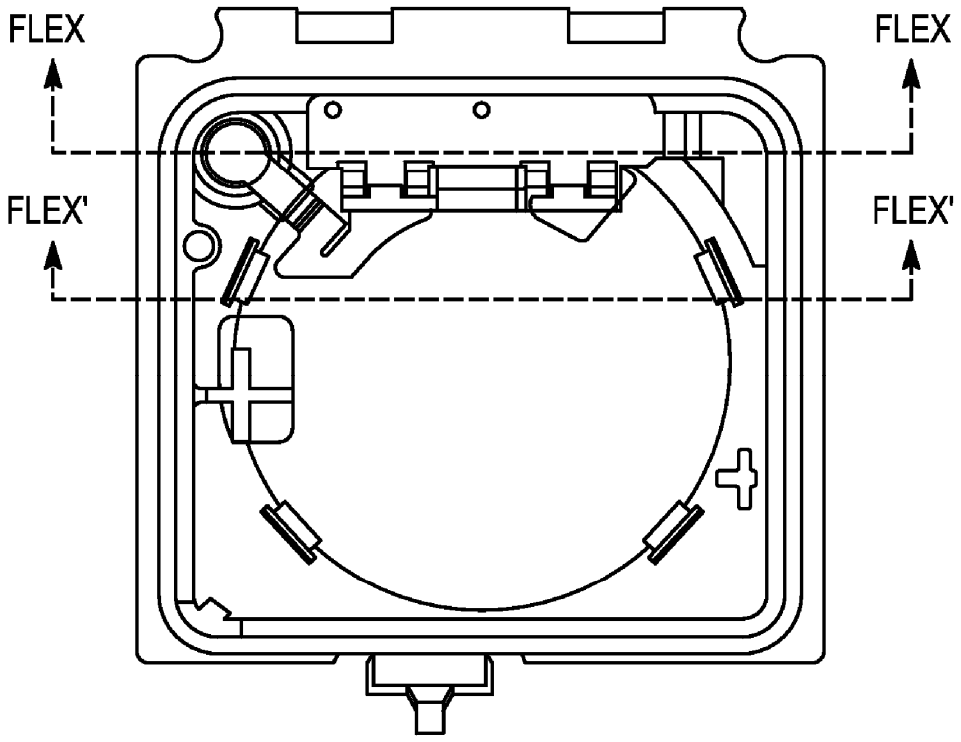
H01Q 1/24 (2006.01)

H01Q 1/38 (2006.01)

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

(57) **ABSTRACT**

A radio is presented in which a short-range antenna, along with a speaker, is contained within a non-conductive speaker bracket. The antenna is a PIFA that is bent and extends through the speaker bracket so that the distance between the free end of the PIFA and various metallic components of the radio including the chassis and speaker is maximized. The structure containing the PIFA is flexible and also contains a contact area where feed/ground contact for the PIFA is made as well as contact for audio components including a speaker and microphone. A flexible cable and extension portion of the flexible structure routes the signals to the audio components far enough away from the PIFA so that the amount of crosstalk is insignificant. The free end of the PIFA and launch pad where feed/ground contact for the PIFA is made are non-planar.



US 20120026048A1

(19) **United States**

(12) **Patent Application Publication**

Vazquez et al.

(10) **Pub. No.: US 2012/0026048 A1**

(43) **Pub. Date: Feb. 2, 2012**

(54) **CLUTCH BARREL ANTENNA FOR WIRELESS ELECTRONIC DEVICES**

(76) Inventors: **Enrique Ayala Vazquez**, Watsonville, CA (US); **Hao Xu**, Cupertino, CA (US); **Gregory A. Springer**, Sunnyvale, CA (US); **Bing Chiang**, Cupertino, CA (US); **Eduardo Lopez Camacho**, Watsonville, CA (US); **Douglas B. Kough**, San Jose, CA (US)

(21) Appl. No.: **13/269,150**

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

Related U.S. Application Data

(63) Continuation of application No. 12/238,385, filed on Sep. 25, 2008, now Pat. No. 8,059,039.

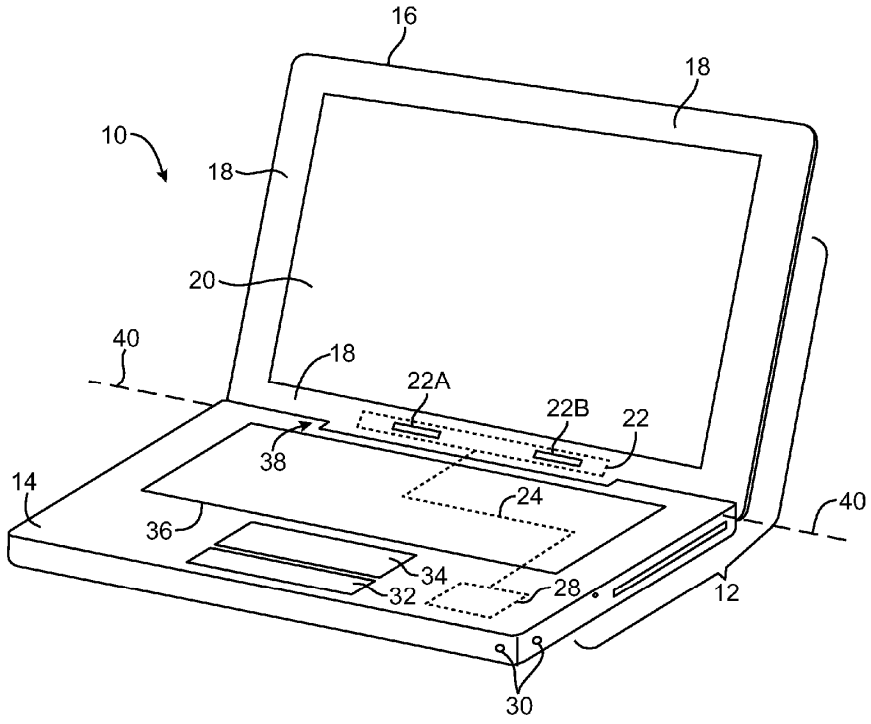
Publication Classification

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

(52) **U.S. Cl.** **343/725**

(57) **ABSTRACT**

Wireless portable electronic devices such as laptop computers are provided with antennas. An antenna may be provided within a clutch barrel in a laptop computer. The clutch barrel may have a dielectric cover. Antenna elements may be mounted within the clutch barrel cover on an antenna support structure. There may be two or more antenna elements mounted to the antenna support structure. These antenna elements may be of different types. A first antenna element for the clutch barrel antenna may be formed from a dual band antenna element having a closed slot and an open slot. A second antenna element for the clutch barrel antenna may be formed from a dual band antenna element of a hybrid type having a planar resonating element arm and a slot resonating element. Flex circuit structures may be used in implanting the first and second antenna elements for the clutch barrel antenna.



US 20120026057A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2012/0026057 A1**

(43) **Pub. Date: Feb. 2, 2012**

TESHIMA

(54) **ANTENNA DEVICE**

(75) Inventor: **Masao TESHIMA**, Kunitachi-shi (JP)

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

(21) Appl. No.: **13/193,989**

(22) Filed: **Jul. 29, 2011**

(30) **Foreign Application Priority Data**

Jul. 30, 2010 (JP) 2010-172209

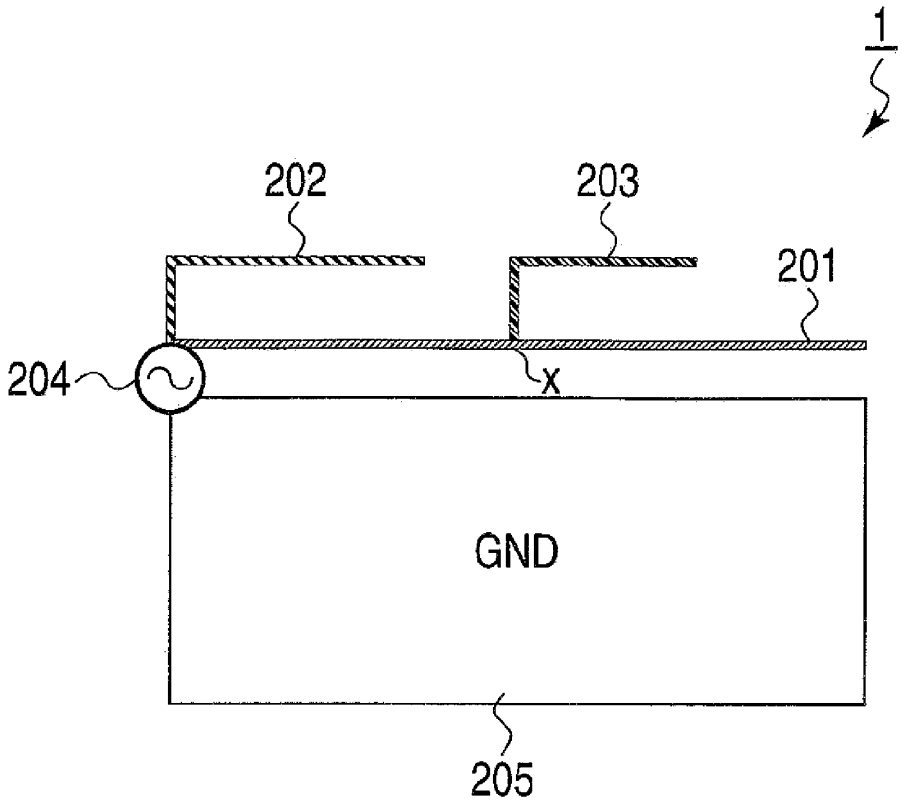
Publication Classification

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

(52) **U.S. Cl.** **343/843**; 343/893

(57) **ABSTRACT**

According to one embodiment, an antenna device includes a linear first antenna element, a linear second antenna element and a linear third antenna element. One end of the first antenna element is connected to a feeding point. One end of the second antenna element is connected to the feeding point. A length of the second antenna element is shorter than a length of the first antenna element. One end of the third antenna element is connected onto the first antenna element. A length of the third antenna element is shorter than the length of the first antenna element.



US 20120026059A1

(19) **United States**

(12) **Patent Application Publication**

Yoshioka

(10) **Pub. No.: US 2012/0026059 A1**

(43) **Pub. Date: Feb. 2, 2012**

(54) **ANTENNA DEVICE**

(76) Inventor: **Hiroki Yoshioka**, Tokyo (JP)

(21) Appl. No.: **13/262,370**

(22) PCT Filed: **Mar. 31, 2010**

(86) PCT No.: **PCT/JP2010/055789**

§ 371 (c)(1),
(2), (4) Date: **Sep. 30, 2011**

(30) **Foreign Application Priority Data**

Apr. 3, 2009 (JP) 2009-090820

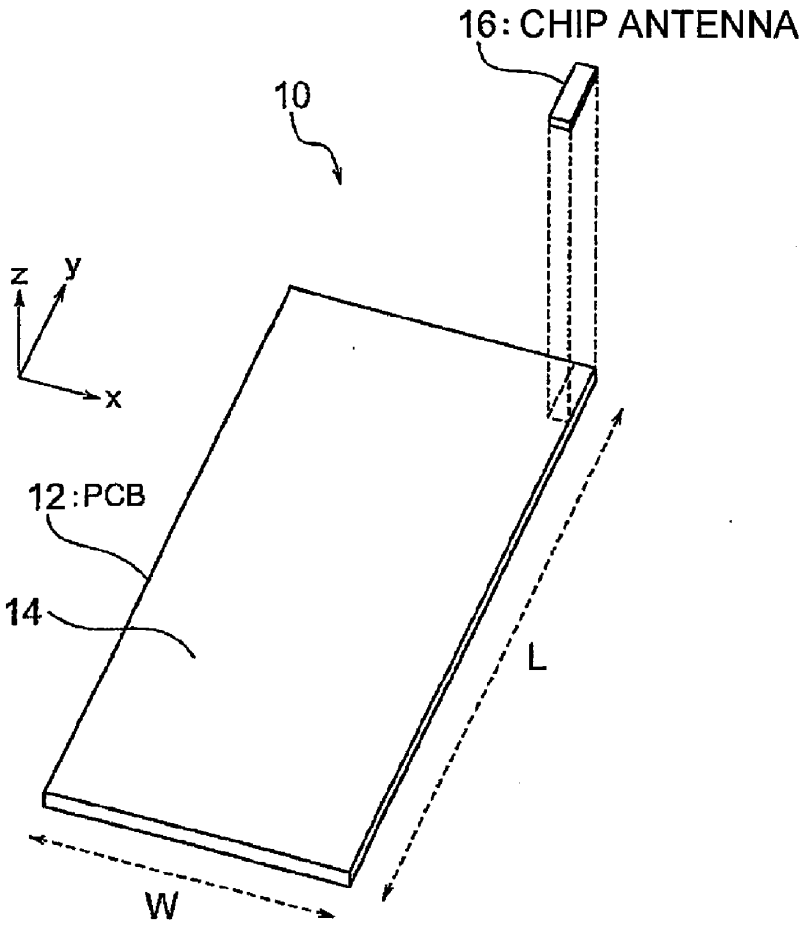
Publication Classification

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

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

(57) **ABSTRACT**

A circularly polarized antenna device can reduce degradation of radiation characteristics. The antenna device includes a rectangular ground plate having long sides and short sides and an antenna element disposed in the vicinity of a corner of the ground plate. The antenna element is disposed such that a longitudinal direction thereof is along an edge of the ground plate. When the long side of the ground plate has an electrical length given by L and the short side of the ground plate has an electrical length given by W, the ratio (L/W) is in the range of 1.73 to 2.75.



US 20120026063A1

(19) **United States**

(12) **Patent Application Publication**

LEE et al.

(10) **Pub. No.: US 2012/0026063 A1**

(43) **Pub. Date: Feb. 2, 2012**

(54) **APPARATUS AND METHOD FOR MATCHING IMPEDANCE USING STANDING WAVE RATIO INFORMATION**

(75) Inventors: **Sang Hun LEE**, Seoul (KR); **Sang Bae CHO**, Seoul (KR); **Dong Chan PARK**, Seoul (KR); **Chang Wook KIM**, Seoul (KR); **Ju Young SONG**, Seoul (KR)

(73) Assignee: **LG INNOTEK CO., LTD.**, Seoul (KR)

(21) Appl. No.: **13/180,833**

(22) Filed: **Jul. 12, 2011**

(30) **Foreign Application Priority Data**

Aug. 2, 2010 (KR) 10-2010-0074591

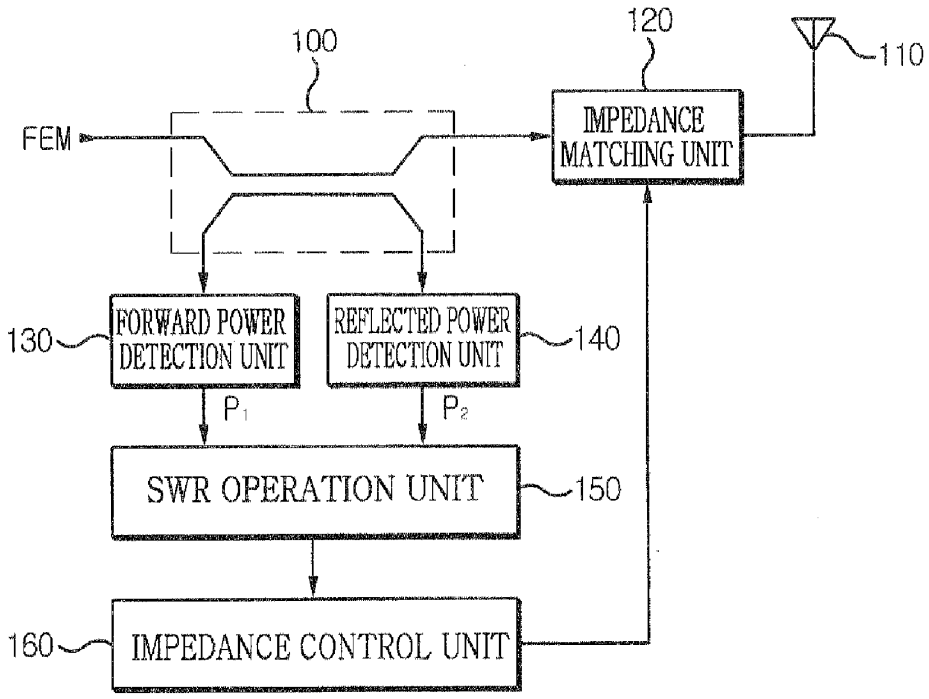
Publication Classification

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

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

(57) **ABSTRACT**

An apparatus and method for matching impedance of an antenna by using Standing Wave Ratio (SWR) information is provided. While the impedance of the impedance matching unit is controlled, a region of a Smith chart in which initial total impedance of the impedance matching unit and the antenna is located by using an SWR calculated by an SWR operation unit, and the impedance of the impedance matching unit is controlled according to the determined region, thus correctly matching the impedance of the antenna.



US 20120026064A1

(19) **United States**

(12) **Patent Application Publication**

Lee et al.

(10) **Pub. No.: US 2012/0026064 A1**

(43) **Pub. Date: Feb. 2, 2012**

(54) **WIDEBAND ANTENNA USING COUPLING MATCHING**

(75) Inventors: **Seung-Cheol Lee**, Incheon (KR); **Byong-Nam Kim**, Kyeonggi-do (KR); **Jong-Ho Jung**, Gyeonggi-do (KR)

(73) Assignee: **ACE TECHNOLOGIES CORPORATION**, Incheon (KR)

(21) Appl. No.: **13/264,737**

(22) PCT Filed: **Apr. 14, 2009**

(86) PCT No.: **PCT/KR2009/001924**

§ 371 (c)(1),
(2), (4) Date: **Oct. 19, 2011**

(30) **Foreign Application Priority Data**

Apr. 14, 2009 (KR) 10-2009-0032377

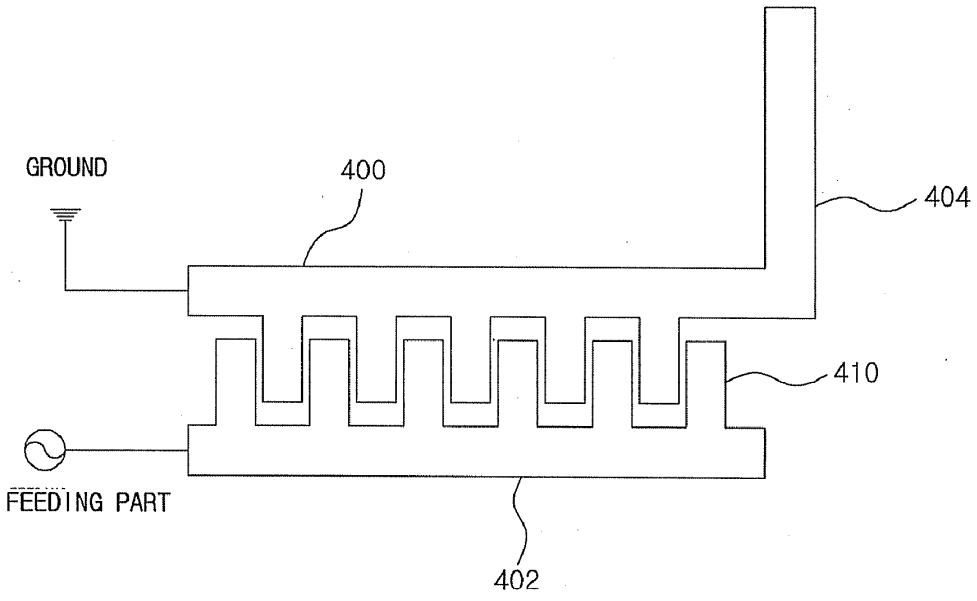
Publication Classification

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

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

(57) **ABSTRACT**

A wide-band antenna using coupling matching is disclosed. The antenna may include a first conductive element, which is electrically connected with a ground; a second conductive element, which is electrically connected with a power feed point and formed parallel to the first conductive element with a particular distance in-between; and a third conductive element for emitting an RF signal that extends from the first conductive element, where the first conductive element and the second conductive element have a particular length such that progressive waves are generated and sufficient coupling is achieved. According to certain aspects of the present invention, a internal type multi-band antenna having wide-band characteristics can be provided, by using coupling matching for multi-band design.



US 20120026067A1

(19) **United States**

(12) **Patent Application Publication**

PARSCHE

(10) **Pub. No.: US 2012/0026067 A1**

(43) **Pub. Date: Feb. 2, 2012**

(54) **ELECTRONIC DEVICE HAVING SOLAR CELL ANTENNA ELEMENT AND RELATED METHODS**

(75) Inventor: **Francis Eugene PARSCHE**, Palm Bay, FL (US)

(73) Assignee: **Harris Corporation**, Melbourne, FL (US)

(21) Appl. No.: **12/844,035**

(22) Filed: **Jul. 27, 2010**

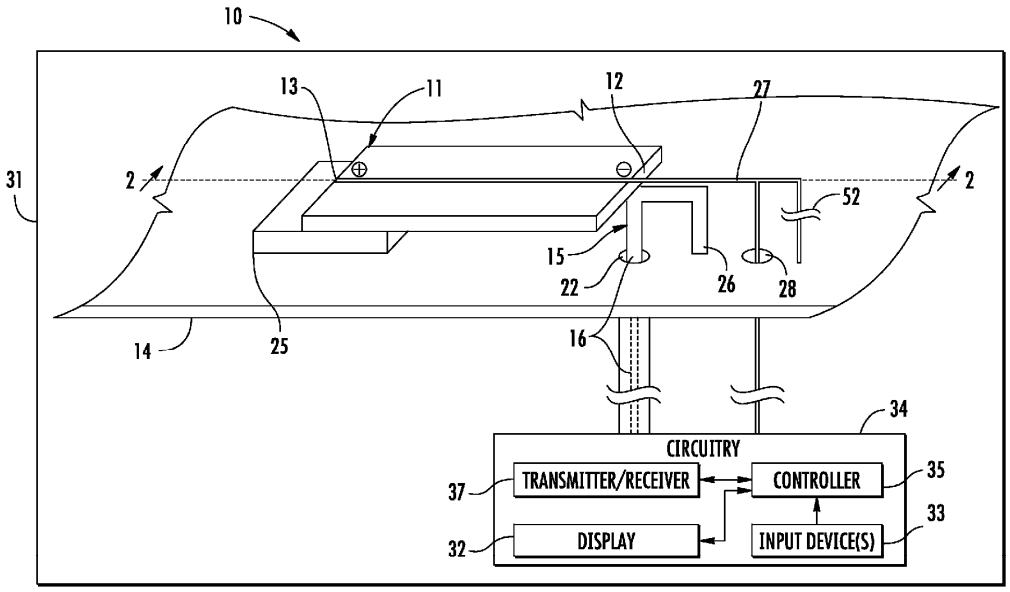
Publication Classification

(51) **Int. Cl.**
H01Q 1/44 (2006.01)

(52) **U.S. Cl.** **343/904**

(57) **ABSTRACT**

An antenna may include a ground plane and a solar cell spaced above the ground plane. The solar cell may have first and second power output terminals. The antenna may include a coaxial antenna feed line including an inner conductor coupled to the first power output terminal, and an outer conductor coupled to the ground plane so that the solar cell also serves as a patch antenna element. The antenna may further include a drive shunt conductor extending between the first terminal and the ground plane.



US 20120027951A1

(19) **United States**

(12) **Patent Application Publication**

Chang et al.

(10) **Pub. No.: US 2012/0027951 A1**

(43) **Pub. Date: Feb. 2, 2012**

(54) **METHOD FOR FORMING ANTENNA STRUCTURE**

(75) Inventors: **Sheng-Chieh Chang**, Hsinchu (TW); **Bau-Yi Huang**, Hsinchu (TW); **Chi-Wen Tsai**, Hsinchu (TW); **Hsin-Hui Hsu**, Hsinchu (TW); **Wen-Kuei Lo**, Hsinchu (TW)

(73) Assignee: **WISTRON NEWEB CORP.**, Hsinchu (TW)

(21) Appl. No.: **13/014,488**

(22) Filed: **Jan. 26, 2011**

(30) **Foreign Application Priority Data**

Jul. 27, 2010 (TW) TW99124659

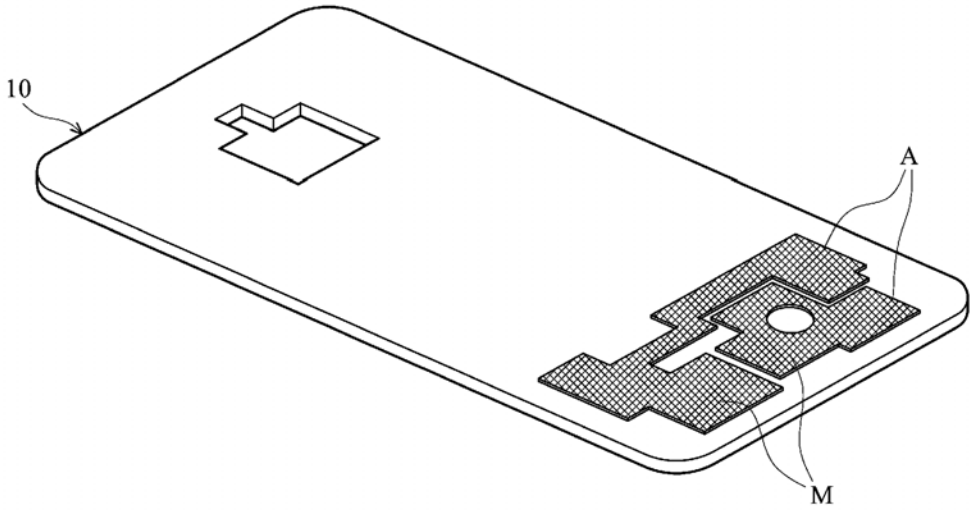
Publication Classification

(51) **Int. Cl.**
B05D 3/06 (2006.01)

(52) **U.S. Cl.** **427/558**; 427/553

(57) **ABSTRACT**

A method for forming an antenna structure is provided, including the following steps of: providing a non-conductive frame and forming a photosensitive medium layer on the non-conductive frame, wherein the medium layer comprises a catalyzer for electroless deposition; applying a light beam through a transparent portion of a mask to the medium layer, such that a part of the medium layer is solidified within a predetermined region on the non-conductive frame; removing a part of the medium layer outside of the predetermined region; and forming a metal layer on the medium layer within the predetermined region.



US 20120028685A1

(19) **United States**

(12) **Patent Application Publication**

VAN WONTERGHEM et al.

(10) **Pub. No.: US 2012/0028685 A1**

(43) **Pub. Date: Feb. 2, 2012**

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

(75) Inventors: **Jari Kristian VAN WONTERGHEM**, Ottawa (CA); **Xiaoping Qin**, Ottawa (CA); **Subum Park**, Ottawa (CA)

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

(21) Appl. No.: **12/847,036**

(22) Filed: **Jul. 30, 2010**

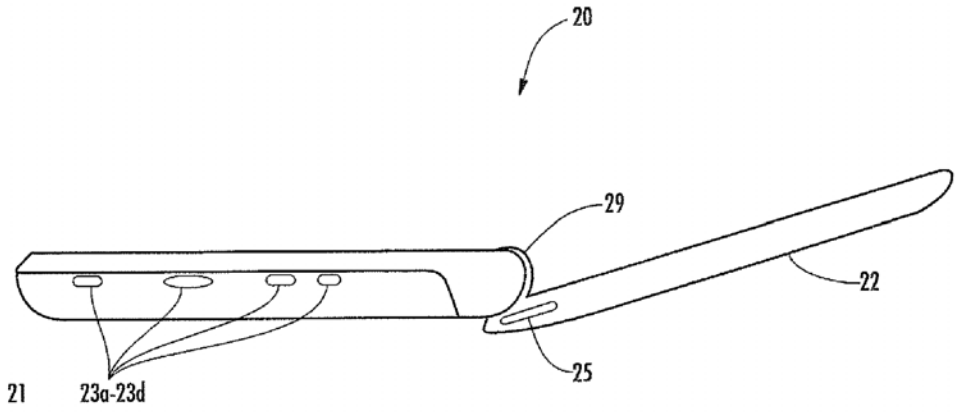
Publication Classification

(51) **Int. Cl.**
H04M 1/00 (2006.01)
H04B 1/38 (2006.01)

(52) **U.S. Cl.** **455/566**; 455/575.3

(57) **ABSTRACT**

A mobile wireless communications device may include first and second housings, a hinge pivotally coupling the first and second housings, and a first antenna carried by the first housing. The mobile wireless communications device may include a second antenna carried by the second housing, wireless transceiver circuitry carried by the first housing and configured for spatial diversity operation with the first and second antennas, and a hinge connector carried by the hinge and coupling the second antenna to the wireless transceiver circuitry.



US 20120028692A1

(19) **United States**

(12) **Patent Application Publication**

Nishizono et al.

(10) **Pub. No.: US 2012/0028692 A1**

(43) **Pub. Date: Feb. 2, 2012**

(54) **PORTABLE TERMINAL**

(75) Inventors: **Mitsuhiro Nishizono**, Kanagawa (JP); **Hiroshi Sakai**, Kanagawa (JP)

(73) Assignee: **KYOCERA CORPORATION**, Kyoto (JP)

(21) Appl. No.: **13/258,938**

(22) PCT Filed: **Mar. 26, 2010**

(86) PCT No.: **PCT/JP2010/055444**

§ 371 (c)(1), (2), (4) Date: **Sep. 22, 2011**

(30) **Foreign Application Priority Data**

Mar. 26, 2009 (JP) 2009-077771

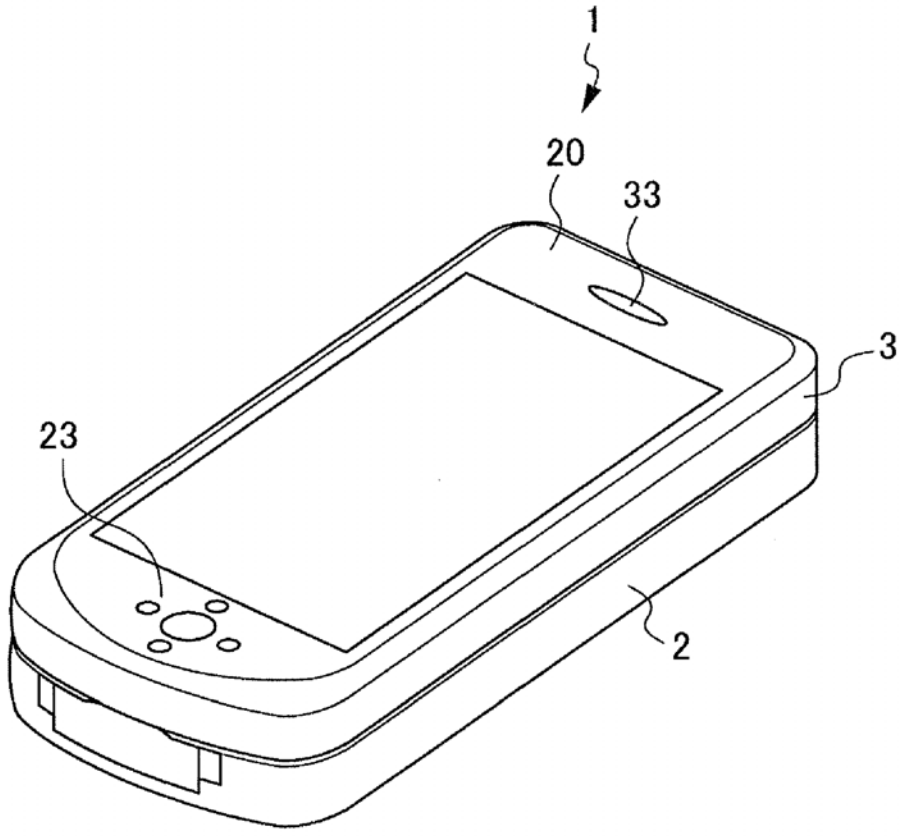
Publication Classification

(51) **Int. Cl.**
H04W 88/02 (2009.01)

(52) **U.S. Cl.** **455/575.1**

(57) **ABSTRACT**

Provided is a portable terminal capable of ensuring satisfactory antenna characteristics regardless of a change in state, and of accommodating a plurality of frequency bands. A first circuit unit (**38**) comprises: a first signal source (**33**); a first power feeding unit (**34**) connected to a first antenna unit (**31**); a second power feeding unit (**35**) connected to a first connection unit (**32**); a first switching unit (**36**) which connects the first power feeding unit (**34**) or the second power feeding unit (**35**) to the first signal source (**33**) by switching; and a first control unit (**37**) which controls the first switching unit (**36**) so as to connect the second power feeding unit (**35**) to the first signal source (**33**) when the portable terminal is transitioned to a second state. A first disconnection unit (**39**) is disposed between the first connection unit (**32**) and the first circuit unit (**38**) and disconnects a first signal (S**1**).



US 20120032856A1

(19) **United States**

(12) **Patent Application Publication**

HUANG et al.

(10) **Pub. No.: US 2012/0032856 A1**

(43) **Pub. Date: Feb. 9, 2012**

(54) **PLANAR ANTENNA**

(75) Inventors: **GUO-LUN HUANG**, Hsinchu County (TW); **Chih-Ming Wang**, Hsinchu County (TW)

(73) Assignee: **Wistron NeWeb Corp.**, Hsinchu County (TW)

(21) Appl. No.: **12/977,186**

(22) Filed: **Dec. 23, 2010**

(30) **Foreign Application Priority Data**

Aug. 4, 2010 (TW) 099214905

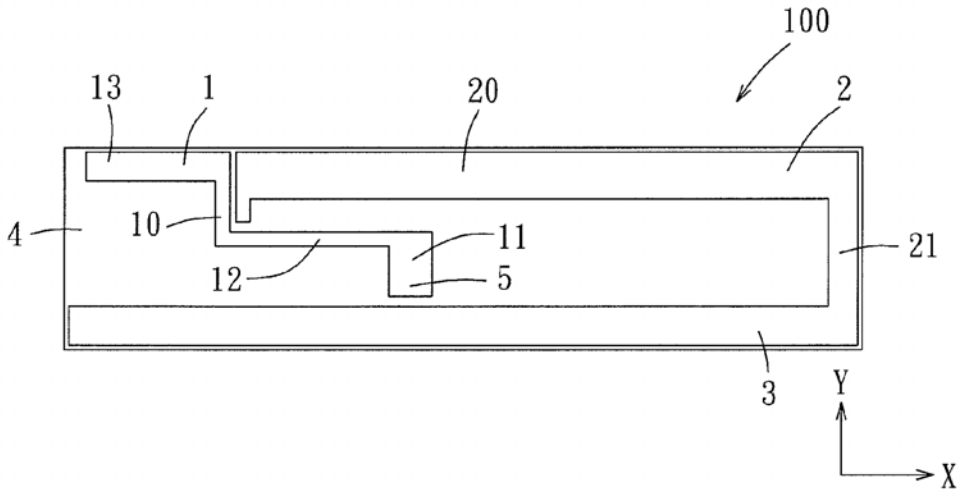
Publication Classification

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

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

(57) **ABSTRACT**

A planar antenna includes a grounding part, a first radiator arm and a second radiator arm. The first radiator arm is spaced apart from the grounding part, and includes a first coupling section and a feed-in end. The second radiator arm includes an extension section and a second coupling section. The extension section has one end connected to the grounding part, and further has another end connected to the second coupling section. The first coupling section extends in a first direction substantially perpendicular to a second direction in which the second coupling section extends. The first coupling section is spaced apart from the second coupling section such that signals transmitted through the first coupling section may be coupled to the second coupling section.



US 20120032857A1

(19) **United States**

(12) **Patent Application Publication**

LAI et al.

(10) **Pub. No.: US 2012/0032857 A1**

(43) **Pub. Date: Feb. 9, 2012**

(54) **MOBILE WIRELESS DEVICE WITH MULTI-BAND LOOP ANTENNA AND RELATED METHODS**

(75) Inventors: **Chun Kit LAI**, Sunrise, FL (US); **Milan Velimir LUKIC**, Sunrise, FL (US); **Soo Liam OOI**, Sunrise, FL (US)

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

(21) Appl. No.: **13/009,183**

(22) Filed: **Jan. 19, 2011**

Related U.S. Application Data

(60) Provisional application No. 61/371,969, filed on Aug. 9, 2010.

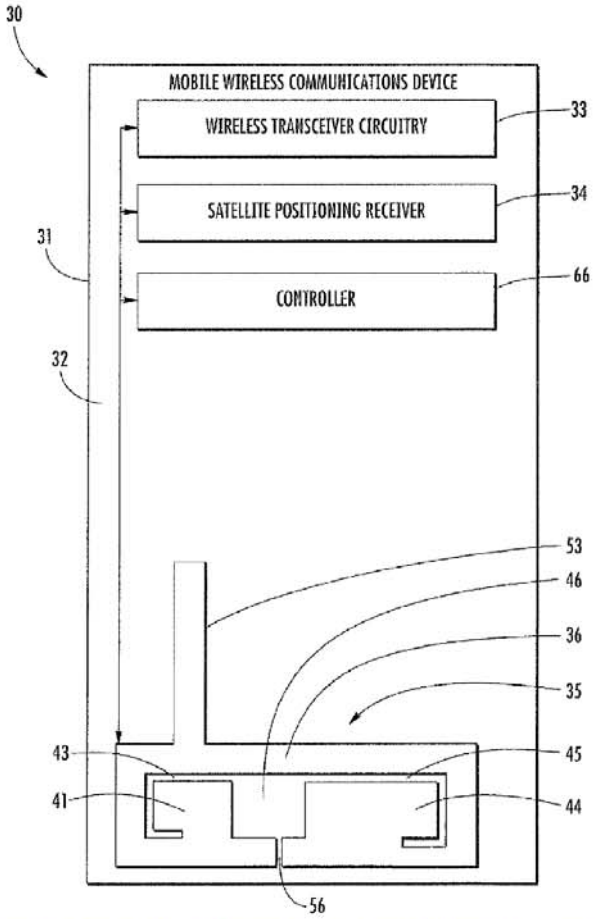
Publication Classification

(51) **Int. Cl.**
H01Q 1/38 (2006.01)
H01P 11/00 (2006.01)

(52) **U.S. Cl.** ..... **343/700 MS**; 29/601

(57) **ABSTRACT**

A mobile wireless communications device may include a portable housing, a printed circuit board (PCB) carried by the portable housing, and wireless transceiver circuitry carried by the PCB. The mobile wireless communications device also may include an antenna coupled to the wireless transceiver circuitry. The antenna may include a loop conductor, a first conductor body coupled to the loop conductor and extending into the interior thereof to define a first slotted opening with adjacent portions of the loop conductor, and a second conductor body coupled to the loop conductor and extending into the interior thereof to define a second slotted opening with adjacent portions of the loop conductor. The antenna may further include a conductor arm coupled to the loop conductor and extending outwardly therefrom. The first and second conductor bodies may be spaced apart to define a third slotted opening therebetween.



US 20120032858A1

(19) **United States**

(12) **Patent Application Publication**

CHANG et al.

(10) **Pub. No.: US 2012/0032858 A1**

(43) **Pub. Date: Feb. 9, 2012**

(54) **ELECTRONIC DEVICE HAVING ANTENNA PATTERN EMBEDDED IN CASE AND METHOD FOR MANUFACTURING THE SAME**

(75) Inventors: **Ki Won CHANG**, Suwon (KR); **Jae Suk SUNG**, Yongin (KR); **Ha Ryong HONG**, Hwaseong (KR); **Dae Kyu LEE**, Suwon (KR); **Tae Sung KIM**, Seoul (KR); **Chang Mok HAN**, Cheonan (KR); **Hyun Kil NAM**, Suwon (KR); **Dae Seong JEON**, Suwon (KR); **Duk Woo LEE**, Suwon (KR); **Won Wook SO**, Anyang (KR)

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

(21) Appl. No.: **13/093,405**

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

(30) **Foreign Application Priority Data**

Aug. 6, 2010 (KR) 10-2010-0076105

Publication Classification

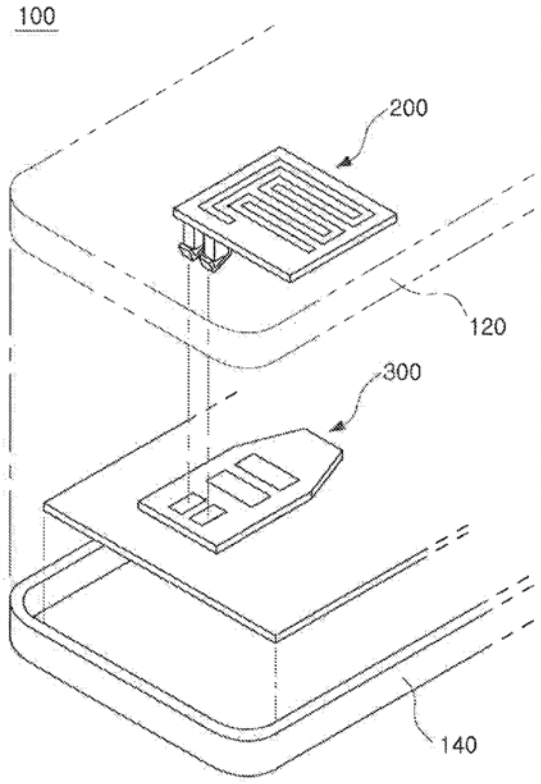
(51) **Int. Cl.**

H01Q 1/24	(2006.01)
B29C 70/68	(2006.01)
B29C 69/00	(2006.01)
B29D 99/00	(2010.01)

(52) **U.S. Cl.** **343/702**; 264/255

(57) **ABSTRACT**

An electronic device having an antenna pattern embedded in a case and a method for manufacturing the same are provided. The electronic device includes: a radiator embedded within a case and having an antenna pattern part for transmitting and receiving a signal; a smart card having a matching unit for matching a signal between a main board separated from the case and the radiator and a connection pad formed on one surface thereof to electrically connect the radiator and the matching unit; and a coupling member having one end portion coupled to the radiator so as to be embedded within the case and the other end portion protruded from a lower surface of the case so as to be elastically in contact with the connection pad to allow the radiator and the matching unit to be electrically coupled.



US 20120032859A1

(19) **United States**

(12) **Patent Application Publication**

LIN

(10) **Pub. No.: US 2012/0032859 A1**

(43) **Pub. Date: Feb. 9, 2012**

(54) **MARK ANTENNA AND ELECTRONIC DEVICE**

(75) Inventor: **WEN-HAN LIN**, TAIPEI COUNTY (TW)

(73) Assignees: **INVENTEC APPLIANCES CORP.**, NEW TAIPEI CITY (TW); **INVENTEC APPLIANCES (SHANGHAI) CO. LTD.**, Shanghai (CN)

(21) Appl. No.: **13/118,908**

(22) Filed: **May 31, 2011**

(30) **Foreign Application Priority Data**

Aug. 3, 2010 (CN) 201020278435.X

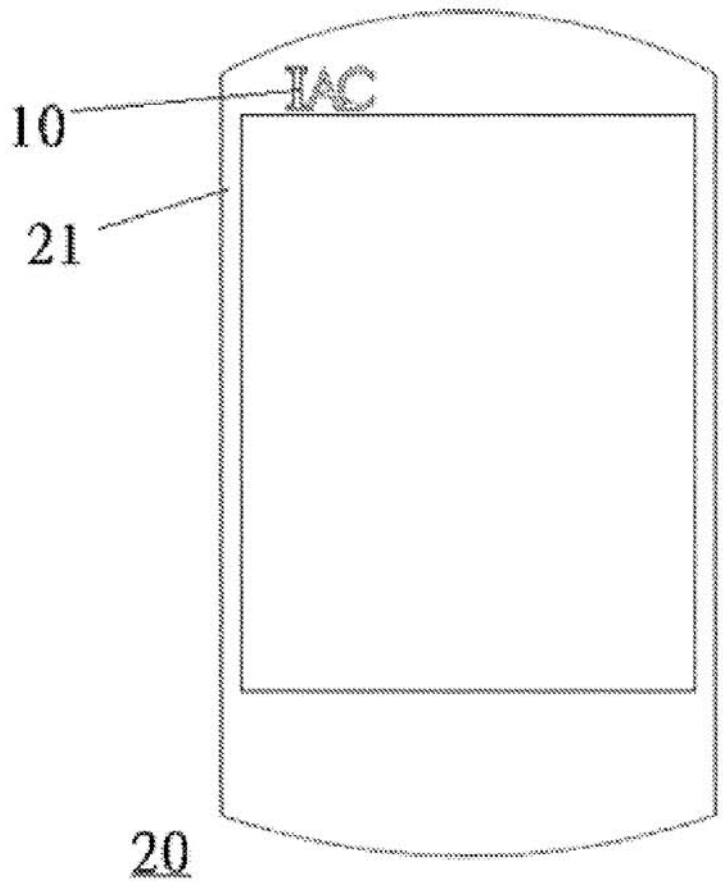
Publication Classification

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

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

(57) **ABSTRACT**

The present invention discloses a mark antenna used for receiving and transmitting a wireless signal. The mark antenna comprises a ground point, a feed point and a radiation part connecting to the ground point and the feed point, and particularly the radiation part is an identification mark, such that the appearance of the radiation part can provide identification information. With the light, thin, short and compact design concept, the mark antenna can be exposed to prevent the antenna from being compressed due to the small disposed area and overcome the difficulty of designing the antenna or a poor communication quality caused by the low performance of the antenna. In the present invention, the antenna is designed as a logo directly, such that the antenna can achieve the functions of identifying the appearance as well as transmitting and receiving the wireless signals.



US 20120032862A1

(19) **United States**

(12) **Patent Application Publication**

Ying

(10) **Pub. No.: US 2012/0032862 A1**

(43) **Pub. Date: Feb. 9, 2012**

(54) **ANTENNA ARRANGEMENT, DIELECTRIC SUBSTRATE, PCB & DEVICE**

(75) Inventor: **Zhinong Ying**, Lund (SE)

(73) Assignee: **SONY ERICSSON MOBILE COMMUNICATIONS AB**, Lund (SE)

(21) Appl. No.: **13/177,617**

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

Related U.S. Application Data

(60) Provisional application No. 61/371,959, filed on Aug. 9, 2010.

(30) **Foreign Application Priority Data**

Aug. 9, 2010 (EP) 10172270.0
Mar. 8, 2011 (EP) PCT/EP2011/053452

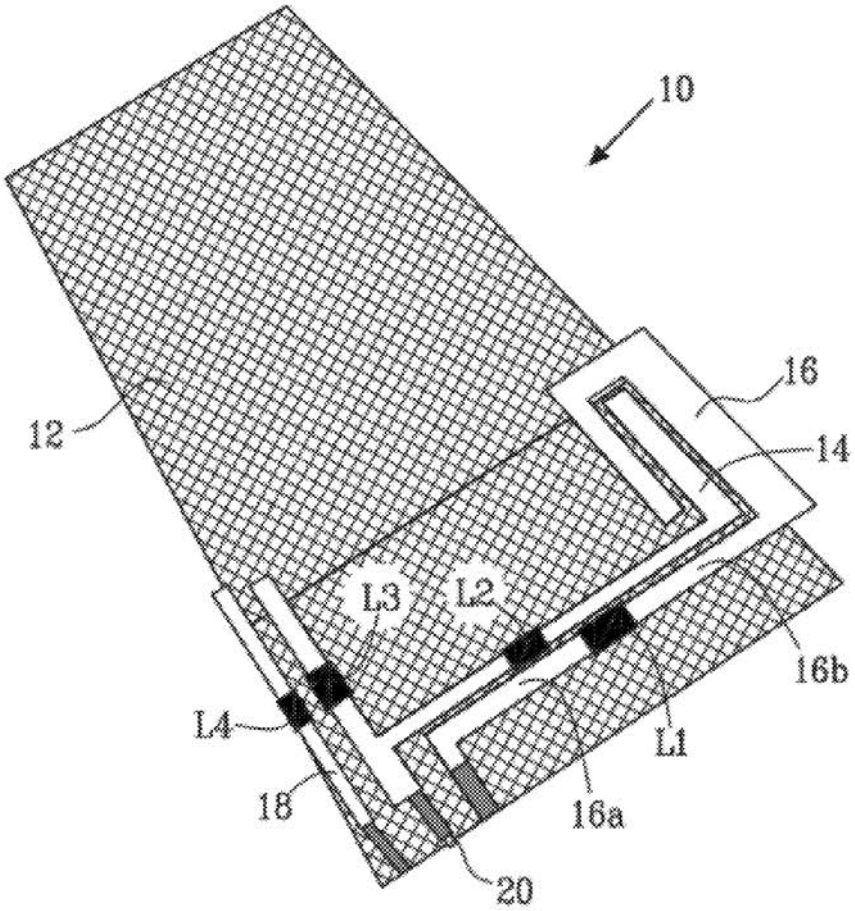
Publication Classification

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

(52) **U.S. Cl.** **343/749**

(57) **ABSTRACT**

An antenna arrangement may include a ground plane, a feeding branch, a first branch and a second branch. The first branch may be longer than the second branch. The feeding branch may be capacitively coupled to the first branch. The feeding branch, the first branch, and the second branch include inductor loading and may be arranged in a single plane at a distance from the ground plane.



US 20120032863A1

(19) **United States**

(12) **Patent Application Publication**

Lai et al.

(10) **Pub. No.: US 2012/0032863 A1**

(43) **Pub. Date: Feb. 9, 2012**

(54) **MOBILE WIRELESS DEVICE WITH ENLARGED WIDTH PORTION MULTI-BAND LOOP ANTENNA AND RELATED METHODS**

(75) Inventors: **Chun Kit Lai**, Sunrise, FL (US); **Milan Velimir Lukic**, Sunrise, FL (US); **Soo Liam Ooi**, Sunrise, FL (US)

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

(21) Appl. No.: **13/009,214**

(22) Filed: **Jan. 19, 2011**

Related U.S. Application Data

(60) Provisional application No. 61/371,989, filed on Aug. 9, 2010.

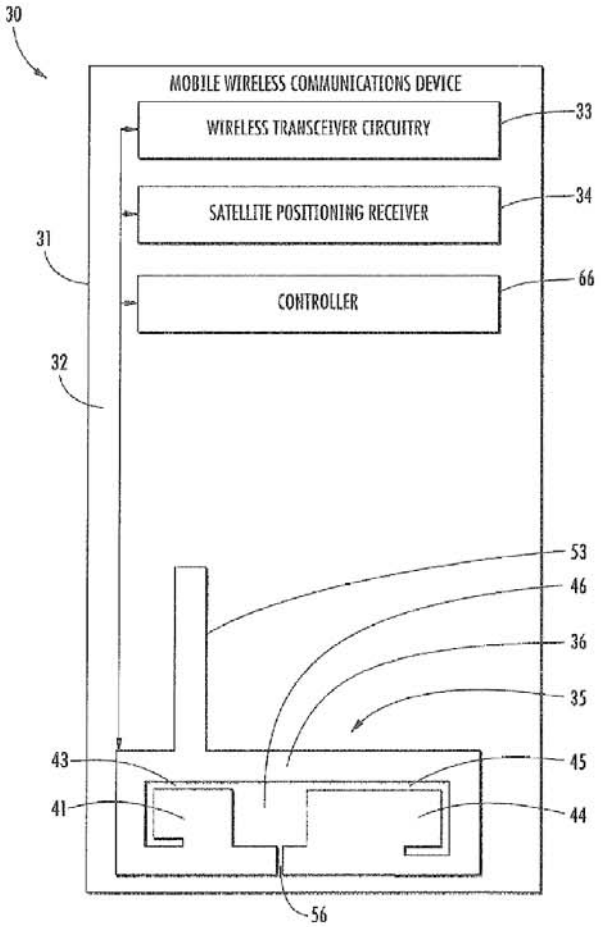
Publication Classification

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

(52) **U.S. Cl.** **343/767**; 29/601

(57) **ABSTRACT**

A mobile wireless communications device may include a portable housing, a printed circuit board (PCB) carried by the portable housing, and wireless transceiver circuitry carried by the PCB. The mobile wireless communications device also may include an antenna coupled to the wireless transceiver circuitry. The antenna may include a loop conductor, a first conductor body coupled to the loop conductor and extending into the interior thereof to define a first slotted opening with adjacent portions of the loop conductor, and a second conductor body coupled to the loop conductor and extending into the interior thereof to define a second slotted opening with adjacent portions of the loop conductor. The first and second conductor bodies may be spaced apart to define a third slotted opening therebetween. The first slotted opening may have an enlarged width portion adjacent the first conductive body.



US 20120032864A1

(19) **United States**

(12) **Patent Application Publication**

HOTTA et al.

(10) **Pub. No.: US 2012/0032864 A1**

(43) **Pub. Date: Feb. 9, 2012**

(54) **ANTENNA DEVICE AND RADIO APPARATUS OPERABLE IN MULTIPLE FREQUENCY BANDS**

(75) Inventors: **Hiroyuki HOTTA**, Tokyo (JP); **Masao TESHIMA**, Tokyo (JP)

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

(21) Appl. No.: **13/269,709**

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

Related U.S. Application Data

(63) Continuation of application No. 10/142,050, filed on May 10, 2002, now Pat. No. 6,859,648, Continuation of application No. 12/142,050, filed on Jun. 19, 2008, now Pat. No. 8,063,827.

(30) **Foreign Application Priority Data**

Jan. 30, 2008 (JP) 2008-19299

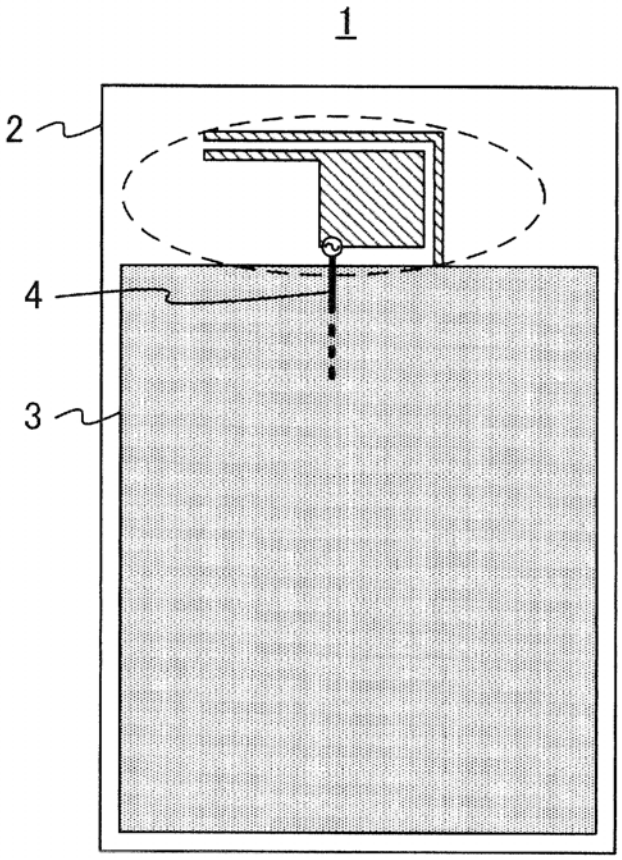
Publication Classification

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

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

(57) **ABSTRACT**

An antenna device usable in a radio apparatus including a printed board includes a ground conductor of the printed board, a first partial element, a second partial element and a parasitic element. The first partial element is shaped into an area having a first side facing a side of the ground conductor and a second side directed to cross the side of the ground conductor, and is provided with a feed portion around a first end of the first side being closer to the second side. The second partial element branches off from the first partial element around one of two ends of the second side being farther from the feed portion, and is directed almost against a direction from the feed portion to a second end of the first side being farther from the second side. The parasitic element has an end grounded around the second end.



US 20120032866A1

(19) **United States**

(12) **Patent Application Publication**

Chen

(10) **Pub. No.: US 2012/0032866 A1**

(43) **Pub. Date: Feb. 9, 2012**

(54) **BROADBAND ANTENNA**

(75) Inventor: **Yen-Cheng Chen**, Hsinchu County (TW)

(73) Assignee: **Wistron NeWeb Corporation**, Hsinchu County (TW)

(21) Appl. No.: **12/985,141**

(22) Filed: **Jan. 5, 2011**

(30) **Foreign Application Priority Data**

Aug. 4, 2010 (TW) 099214904

Publication Classification

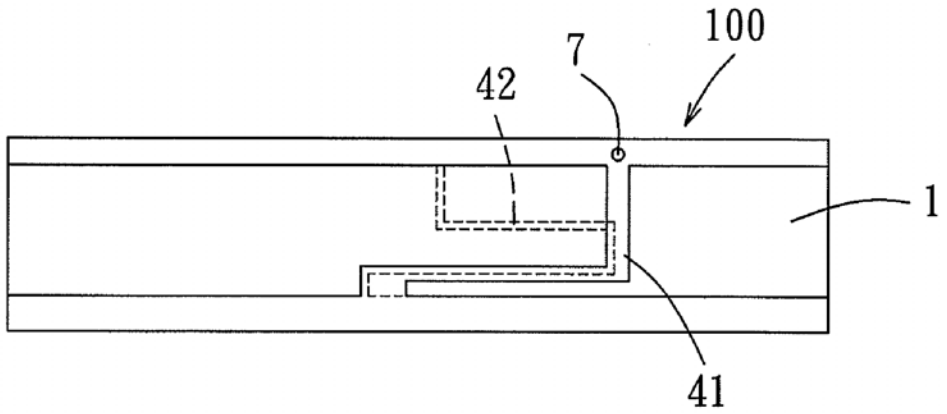
(51) **Int. Cl.**

H01Q 1/48 (2006.01)
H01Q 1/36 (2006.01)
H01Q 1/50 (2006.01)

(52) **U.S. Cl.** **343/846**; 343/906

(57) **ABSTRACT**

A broadband antenna includes a substrate having a first surface on which a first radiator arm, a second radiator arm, a first connecting conductor and a first grounding section are disposed, and a second surface on which a second connecting conductor and a second grounding section are disposed. The first connecting conductor has one end connected to a junction at which the first and second radiator arms are interconnected, and has another end connected to the first grounding section. The first connecting conductor has a feed-in point disposed thereon. The second connecting conductor has one end connected to the second grounding section. Moreover, at least a portion of the first connecting conductor overlaps with a projection of the second connecting conductor onto the first surface so that transmission directions of signals in the first and second connecting conductors are the same.



US 20120032870A1

(19) **United States**

(12) **Patent Application Publication**

Kim et al.

(10) **Pub. No.: US 2012/0032870 A1**

(43) **Pub. Date: Feb. 9, 2012**

(54) **BROADBAND ANTENNA USING COUPLING MATCHING WITH SHORT-CIRCUITED END OF RADIATOR**

(75) Inventors: **Byong-Nam Kim**, Kyeonggi-Do (KR); **Jong-Ho Jung**, Gyeonggi-Do (KR)

(73) Assignee: **ACE TECHNOLOGIES CORPORATION**, Incheon (KR)

(21) Appl. No.: **13/264,680**

(22) PCT Filed: **Apr. 14, 2009**

(86) PCT No.: **PCT/KR2009/001925**

§ 371 (c)(1), (2), (4) Date: **Oct. 19, 2011**

(30) **Foreign Application Priority Data**

Apr. 14, 2009 (KR) 10-2009-0032386

Publication Classification

(51) **Int. Cl.**

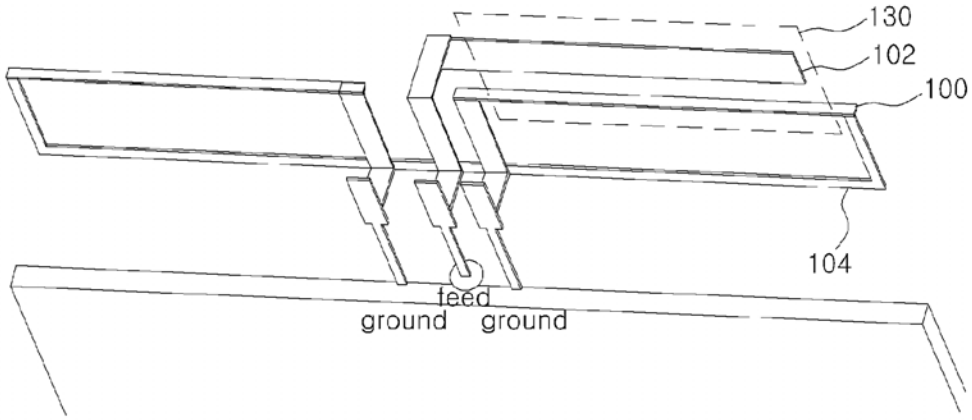
H01Q 9/04 (2006.01)

H01Q 1/50 (2006.01)

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

(57) **ABSTRACT**

An antenna, where an end point of a radiator is shorted, using coupling matching is disclosed. The antenna includes a first conductive element connected electrically to a first ground, a second conductive element connected electrically to a feeding part, and spaced from the first conductive element by a certain distance, a third conductive element extending from the first conductive element and configured to output a RF signal, an end point of the third conductive element being coupled to a second ground. Here, the first conductive element and the second conductive element have a certain length so that a travelling wave is generated and enough coupling is provided. The antenna provides wide band characteristics while maintaining a low profile structure. The frequency characteristics of the antenna are not changed significantly due to external factors such as hand effect and head effect.



US 20120034957A1

(19) **United States**

(12) **Patent Application Publication**

KIM et al.

(10) **Pub. No.: US 2012/0034957 A1**

(43) **Pub. Date: Feb. 9, 2012**

(54) **PORTABLE TERMINAL**

(75) Inventors: **Sang-Hun KIM**, Seoul (KR); **Hyun-Su LIM**, Gyeonggi-do (KR); **Jea-Moon JUNG**, Gyeonggi-do (KR); **Geun-A LEE**, Seoul (KR)

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

(21) Appl. No.: **13/050,227**

(22) Filed: **Mar. 17, 2011**

(30) **Foreign Application Priority Data**

Aug. 5, 2010 (KR) 10-2010-0075417

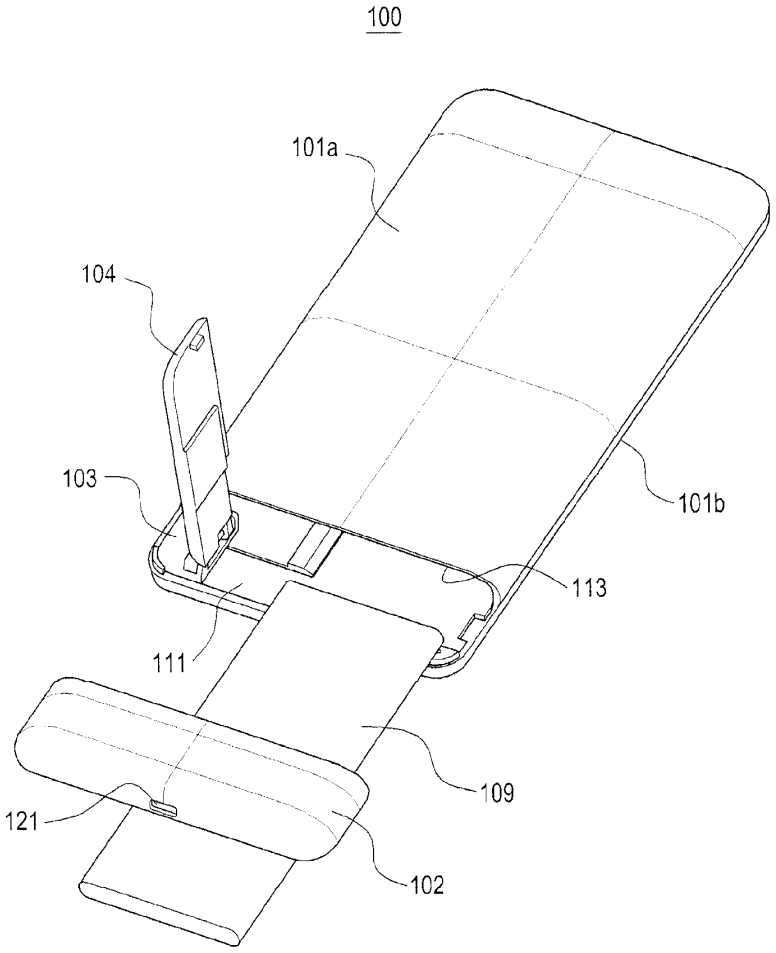
Publication Classification

(51) **Int. Cl.**
H04W 88/02 (2009.01)

(52) **U.S. Cl.** **455/572**

(57) **ABSTRACT**

Provided is a portable terminal including a battery opening extending in a longitudinal direction or a widthwise direction of the portable terminal on a rear surface of the portable terminal, a battery pack inserted into the battery opening in the longitudinal direction or the widthwise direction of the portable terminal, and an antenna module pivotably coupled to the rear surface of the portable terminal to open or close the battery opening. The built-in antenna module can pivot, such that the battery pack can be inserted or ejected in the longitudinal direction or the widthwise direction of the portable terminal.



US 20120037710A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0037710 A1

(43) Pub. Date: Feb. 16, 2012

LE GARREC et al.

(54) **MICROCIRCUIT DEVICE INCLUDING A NEAR-FIELD COMMUNICATION ANTENNA CIRCUIT**

(75) Inventors: **Loïc LE GARREC**, Vitre (FR); **Agnès DUVAL**, Vitre (FR)

(73) Assignee: **Oberthur Technologies**, Levallois Perret (FR)

(21) Appl. No.: **13/197,686**

(22) Filed: **Aug. 3, 2011**

(30) **Foreign Application Priority Data**

Aug. 3, 2010 (FR) 10 56398

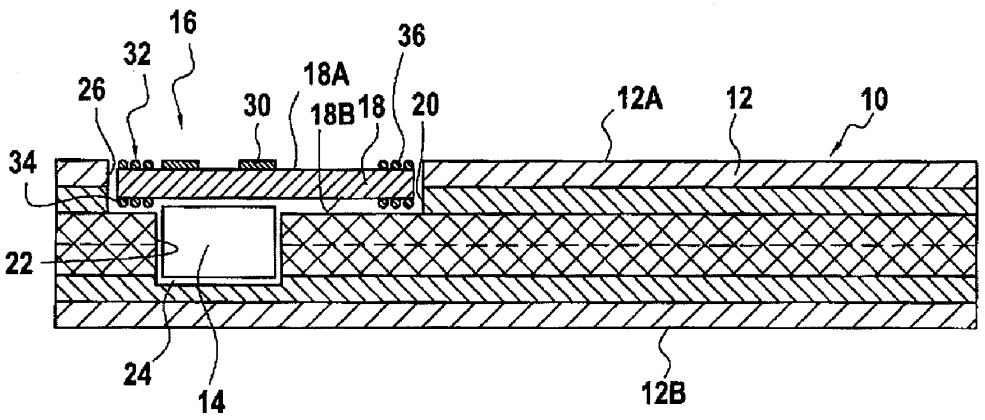
Publication Classification

(51) **Int. Cl.**
G06K 19/077 (2006.01)

(52) **U.S. Cl.** **235/492**

(57) **ABSTRACT**

This circuit (**32**) comprises a first antenna (**34**) connected to the microcircuit (**14**) and capable of supplying power to the microcircuit (**14**) by electromagnetic coupling with an external terminal and a second antenna (**36**) electromagnetically coupled to the first antenna (**34**) while remaining electrically isolated from the latter. In addition, the first (**34**) and second (**36**) antennas consist respectively of first and second windings having opposite winding directions as defined from the same observation point.



US 20120038516A1

(19) **United States**

(12) **Patent Application Publication**

Hsieh et al.

(10) **Pub. No.: US 2012/0038516 A1**

(43) **Pub. Date: Feb. 16, 2012**

(54) **PORTABLE ELECTRONIC DEVICE**

(75) Inventors: **Shih-Wei Hsieh**, Taipei City (TW); **Shyh-Tirng Fang**, Tai-Nan City (TW)

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

(21) Appl. No.: **12/855,608**

(22) Filed: **Aug. 12, 2010**

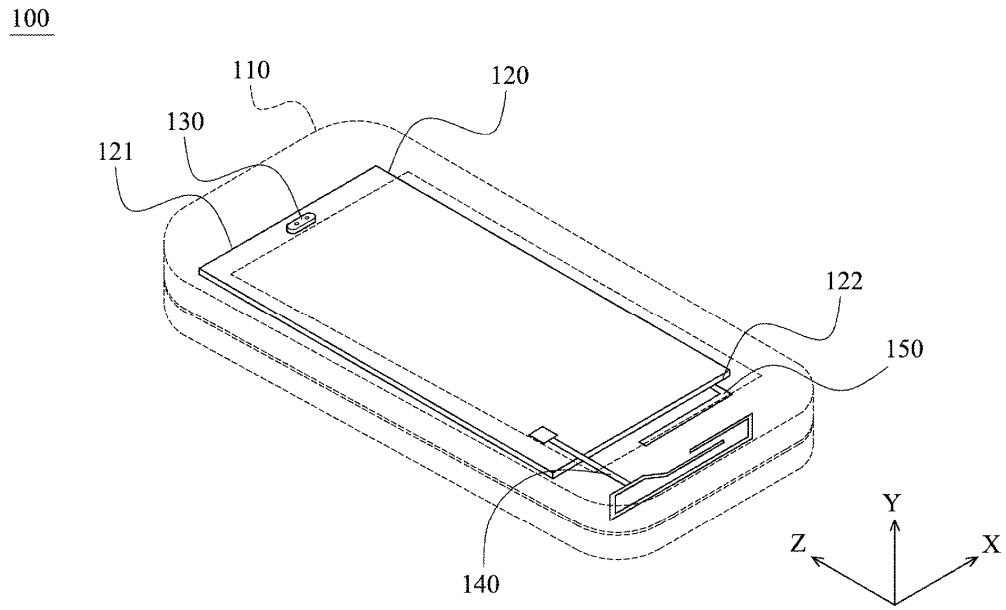
Publication Classification

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

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

(57) **ABSTRACT**

A portable electronic device is provided. The portable electronic device includes a housing, a circuit board, an amplifier, an antenna and a short element. The circuit board is disposed in the housing, wherein the circuit board includes a first edge and a second edge, and the first edge is opposite to the second edge. The amplifier is disposed on the circuit board and adjacent to the first edge. The antenna is disposed on the second edge of the circuit board, wherein the antenna transmits a wireless signal. The short element is disposed on the second edge of the circuit board, wherein the short element is separated from the antenna, and the short element couples with the antenna to reduce Specific Absorption Rate (SAR) value around the amplifier.



US 20120038518A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0038518 A1

(43) Pub. Date: Feb. 16, 2012

WU et al.

(54) **HOUSING OF PORTABLE ELECTRONIC DEVICE AND METHOD FOR MAKING THE SAME**

(75) Inventors: **KUN-TSAN WU**, Shindian (TW); **LI-WEN TIEN**, Shindian (TW)

(73) Assignee: **FIH (HONG KONG) LIMITED**, Kowloon (HK)

(21) Appl. No.: **12/967,153**

(22) Filed: **Dec. 14, 2010**

(30) **Foreign Application Priority Data**

Aug. 12, 2010 (CN) 201010251931.0

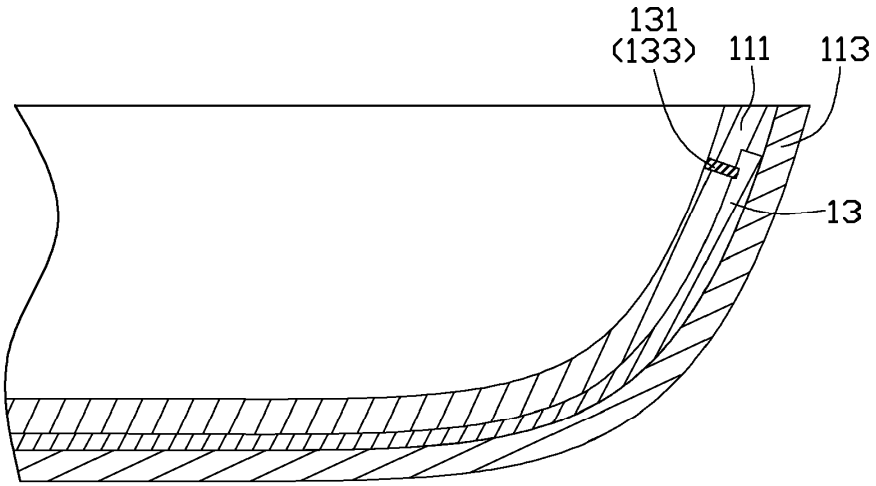
Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
B29C 45/14 (2006.01)

(52) **U.S. Cl.** **343/702**; 264/272.11

(57) **ABSTRACT**

A housing includes a base and an antenna radiator. The base includes a first injection layer and a second injection layer. The first and second injection layers are formed by injecting of moldable plastic and combining to each other. The antenna radiator is sandwiched between the first and second injection layers by insert molding. The antenna radiator is at least partly covered by the first and second injection layer. The antenna radiator includes a plurality of hills and a plurality of valleys defined between adjacent hills. The antenna radiator includes at least two conducting layers and at least one dielectric layer, and adjacent conducting layers electrically are connected to each other and are separated by the dielectric layer.



US 20120038519A1

(19) **United States**

(12) **Patent Application Publication**

SU

(10) **Pub. No.: US 2012/0038519 A1**

(43) **Pub. Date: Feb. 16, 2012**

(54) **MULTI-LOOP ANTENNA SYSTEM AND ELECTRONIC APPARATUS HAVING THE SAME**

(75) Inventor: **SAOU-WEN SU**, TAIPEI (TW)

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

(21) Appl. No.: **13/158,652**

(22) Filed: **Jun. 13, 2011**

(30) **Foreign Application Priority Data**

Aug. 13, 2010 (CN) 201010255304.4

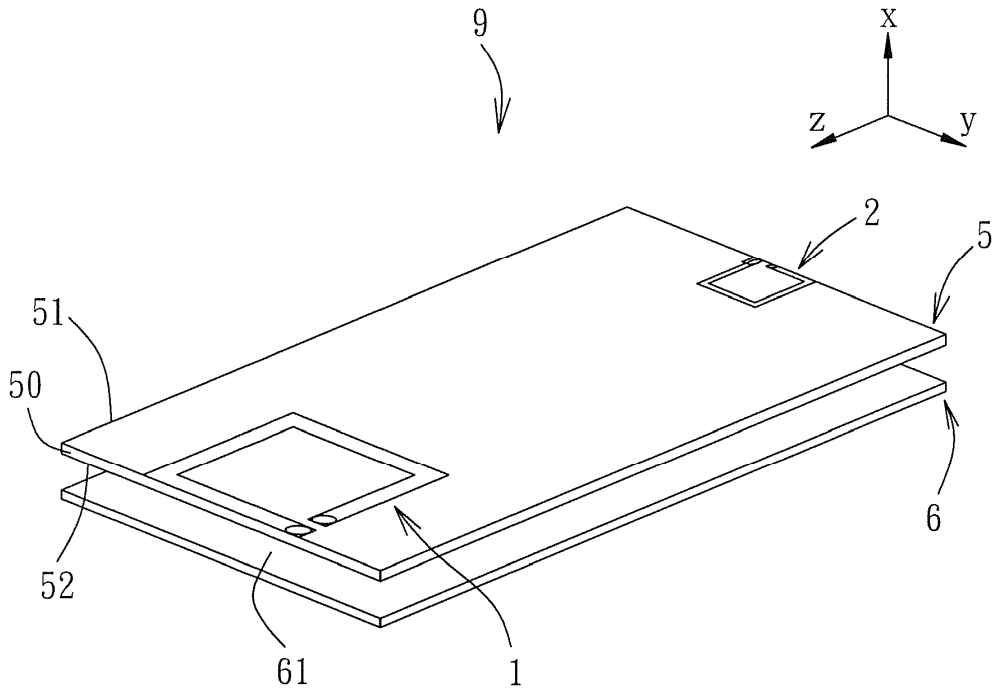
Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 21/30 (2006.01)

(52) **U.S. Cl.** **343/702**; 343/867

(57) **ABSTRACT**

A multi-loop antenna system includes a substrate having opposite first and second surfaces, a first loop antenna disposed on the first surface, and a second loop antenna disposed on one of the first and second surfaces. Each of the first and second loop antennas is operable in a corresponding one of first and second frequency bands, and includes a signal-feed portion and a grounding portion that are disposed adjacent to each other and that are disposed proximate to a respective one of peripheral edges of the substrate, and a radiator portion that has opposite ends connected electrically and respectively to the signal-feed and grounding portions and that cooperates therewith to form a loop.



US 20120038524A1

(19) **United States**

(12) **Patent Application Publication**

Song

(10) **Pub. No.: US 2012/0038524 A1**

(43) **Pub. Date: Feb. 16, 2012**

(54) **IMPEDANCE MATCHING METHOD, IMPEDANCE MATCHING APPARATUS FOR THE SAME, AND RECORD MEDIUM**

(75) Inventor: **Ju Young Song**, Seoul (KR)

(73) Assignee: **LG INNOTEK CO., LTD.**, Seoul (KR)

(21) Appl. No.: **13/197,477**

(22) Filed: **Aug. 3, 2011**

(30) **Foreign Application Priority Data**

Aug. 11, 2010 (KR) 10-2010-0077135

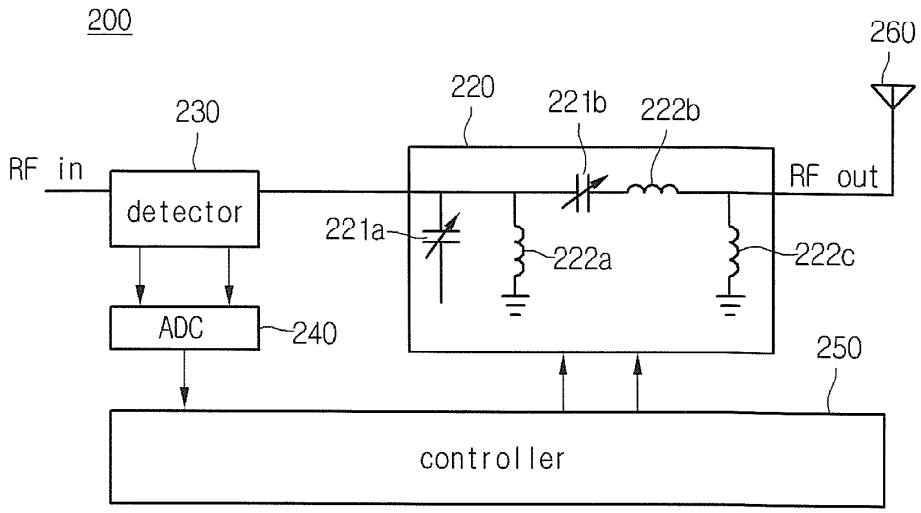
Publication Classification

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

(52) **U.S. Cl.** **343/703**

(57) **ABSTRACT**

Disclosed are an impedance matching method, an impedance matching apparatus for the same, and a record medium. The impedance matching apparatus includes an impedance matching part connected to an antenna to transmit/receive a radio wave and including at least one variable capacitor, a detector to detect transmit power and reflected power reflected by the antenna, and a controller to set a first searching region within a whole variation range of the variable capacitor, to detect an optimal impedance matching point within the first searching region by using at least one of the transmit power and the reflected power, and to set a next searching region about the optimal impedance matching point to search for a final impedance matching point within the whole variation range of the variable capacitor.



US 20120038528A1

(19) **United States**

(12) **Patent Application Publication**

CHIANG

(10) **Pub. No.: US 2012/0038528 A1**

(43) **Pub. Date: Feb. 16, 2012**

(54) **TUNABLE ANTENNA STRUCTURE HAVING A VARIABLE CAPACITOR**

(75) Inventor: **Chi-Ming CHIANG**, Bade City (TW)

(73) Assignee: **AUDEN TECHNO CORP.**

(21) Appl. No.: **12/856,070**

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

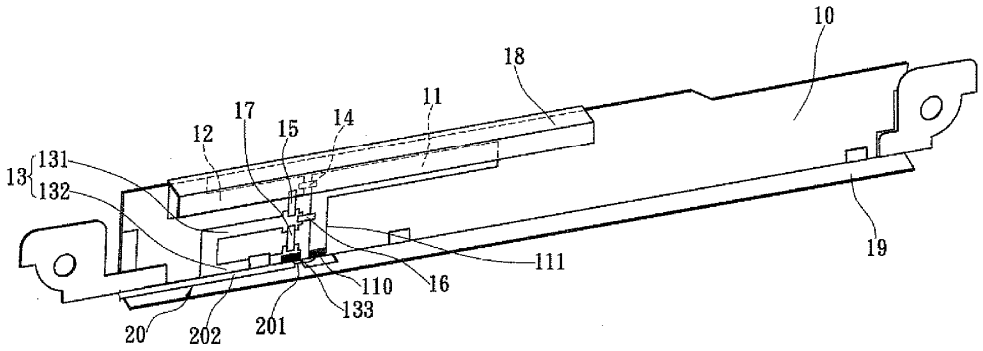
Publication Classification

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

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

(57) **ABSTRACT**

A tunable antenna structure having a variable capacitor includes a substrate, a first metal strip, a second metal strip and a third metal strip formed on the substrate, a variable capacitor element located between the first metal strip and the second metal strip, an inductor element located between the second metal strip and the third metal strip, a first capacitor element located between the first metal strip and the third metal strip, and a second capacitor element located on the third metal strip.



US 20120038531A1

(19) **United States**

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LEE et al.

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(43) **Pub. Date: Feb. 16, 2012**

(54) **ANTENNA APPARATUS HAVING DEVICE CARRIER WITH MAGNETODIELECTRIC MATERIAL**

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(73) Assignee: **SAMSUNG ELECTRONICS CO. LTD.**, Suwon-si (KR)

(21) Appl. No.: **13/192,791**

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

(30) **Foreign Application Priority Data**

Aug. 10, 2010 (KR) 10-2010-0076793

Publication Classification

(51) **Int. Cl.**

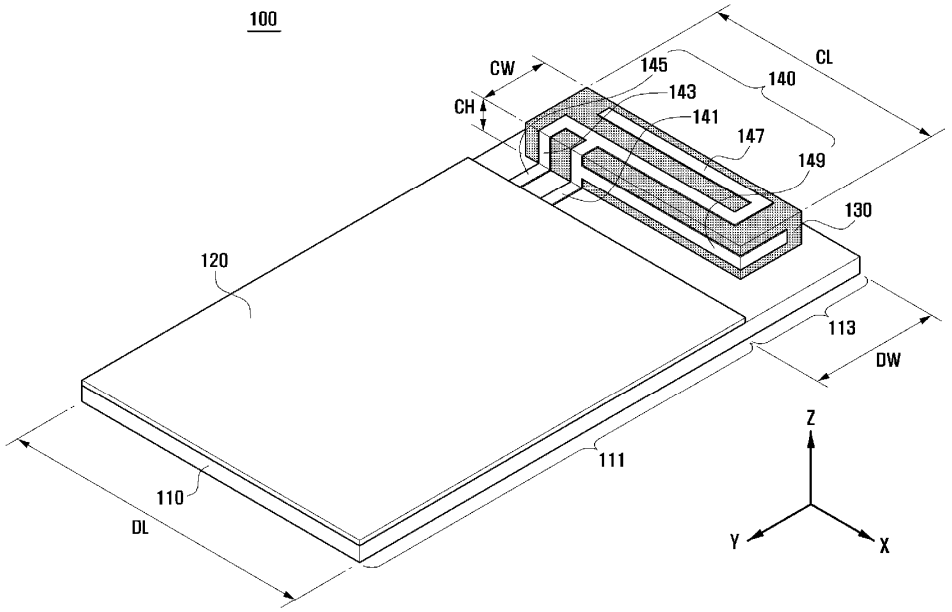
H01Q 1/00 (2006.01)

H01P 11/00 (2006.01)

(52) **U.S. Cl.** **343/787**; 29/600

(57) **ABSTRACT**

An antenna apparatus having a device carrier made of a magneto-dielectric material is provided. The antenna apparatus includes a device carrier having a magnetic carrier made of a magneto-dielectric material, and an antenna device connectable to a power source through a feeding point of one end portion and extended from the feeding point to pass through a surface of the magnetic carrier and operable in a resonant frequency band when power is supplied through the feeding point. Therefore, by forming at least a portion of the device carrier with a magnetic carrier, an operating performance of the antenna apparatus can be improved.



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(12) **Patent Application Publication**

KOTAKA

(10) **Pub. No.: US 2012/0038535 A1**

(43) **Pub. Date: Feb. 16, 2012**

(54) **MULTIBAND ANTENNA AND ELECTRONIC DEVICE**

(75) Inventor: **Yuki KOTAKA**, Tokyo (JP)

(73) Assignee: **CASIO COMPUTER CO., LTD.**, Tokyo (JP)

(21) Appl. No.: **13/197,089**

(22) Filed: **Aug. 3, 2011**

(30) **Foreign Application Priority Data**

Aug. 12, 2010 (JP) 2010-180718

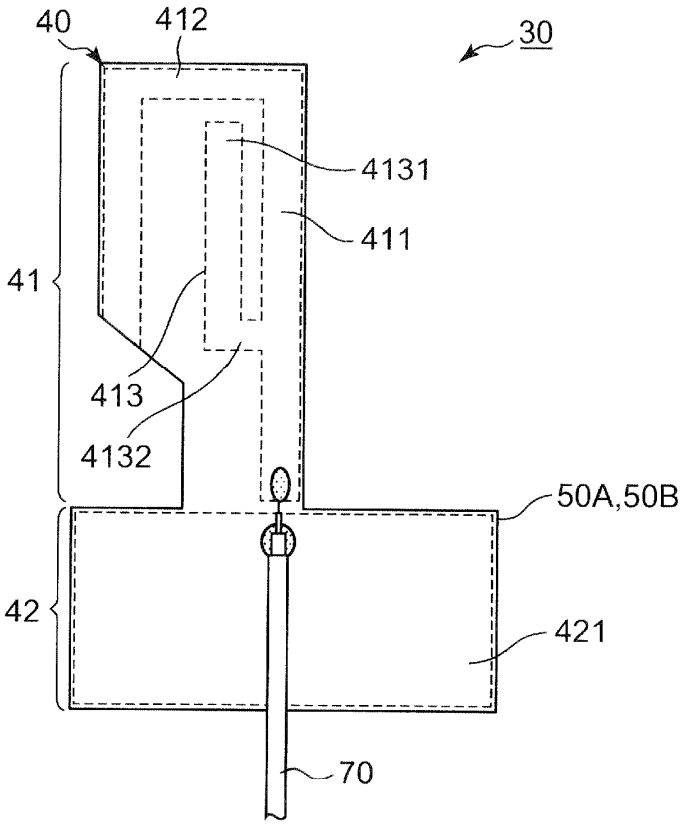
Publication Classification

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

(52) **U.S. Cl.** ..... **343/846**; 343/700 MS

(57) **ABSTRACT**

Disclosed is a multiband antenna, comprising: an antenna element section which is fed from a feeding point; and a ground element section which is connected to a ground of the feeding point; wherein the antenna element section includes: a pole element which includes the feeding point, and has a length at which the pole element resonates at a first frequency; an L-shaped folded-back element which is connected to an end of the pole element, and resonates at a second frequency together with the pole element; and an L-shaped added element which is connected to the pole element; wherein a length from the feeding point to an end of the added element is a length at which the added element resonates at the first frequency.



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(19) **United States**

(12) **Patent Application Publication**

SOLER CASTANY et al.

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(43) **Pub. Date: Feb. 16, 2012**

(54) **ANTENNA STRUCTURE FOR A WIRELESS DEVICE WITH A GROUND PLANE SHAPED AS A LOOP**

(76) Inventors: **Jordi SOLER CASTANY**, Barcelona (ES); **Carles PUENTE BALIARDA**, Barcelona (ES)

(21) Appl. No.: **13/282,767**

(22) Filed: **Oct. 27, 2011**

Related U.S. Application Data

(63) Continuation of application No. 12/834,177, filed on Jul. 12, 2010, now Pat. No. 8,077,110, which is a continuation of application No. 11/719,151, filed on Jun. 13, 2007, now Pat. No. 7,782,269, filed as application No. PCT/EP05/55959 on Nov. 14, 2005.

(60) Provisional application No. 60/627,653, filed on Nov. 12, 2004.

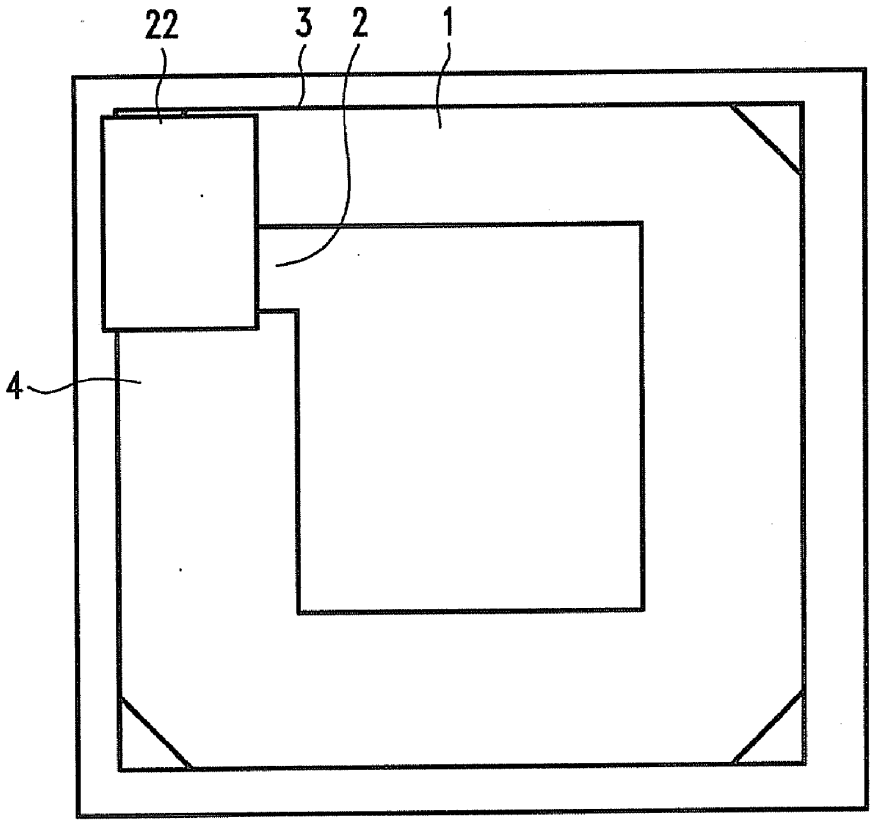
Publication Classification

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

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

(57) **ABSTRACT**

This invention refers to an antenna structure for a wireless device comprising a ground plane and an antenna element, wherein the ground plane has the shape of an open loop. The invention further refers to an antenna structure for a wireless device, such as alight switch or a wristsensor or wristwatch, comprising an open loop ground plane having a first end portion and a second end portion, the open loop ground plane defining an opening between the first end portion and the second end portion; and an antenna component positioned within the opening defined between the first end portion and the second end portion and overlapping at least one of the first end portion or the second end portion. Further the invention refers to a corresponding wireless device and to a method for integrating such an antenna structure in a wireless device.



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(19) **United States**

(12) **Patent Application Publication**

Yamamoto et al.

(10) **Pub. No.: US 2012/0038537 A1**

(43) **Pub. Date: Feb. 16, 2012**

(54) **ANTENNA AND WIRELESS COMMUNICATION DEVICE**

(76) Inventors: **Naotake Yamamoto**, Osaka (JP); **Koichi Ogawa**, Osaka (JP)

(21) Appl. No.: **13/265,951**

(22) PCT Filed: **Feb. 14, 2011**

(86) PCT No.: **PCT/JP2011/000784**

§ 371 (c)(1),
(2), (4) Date: **Oct. 24, 2011**

(30) **Foreign Application Priority Data**

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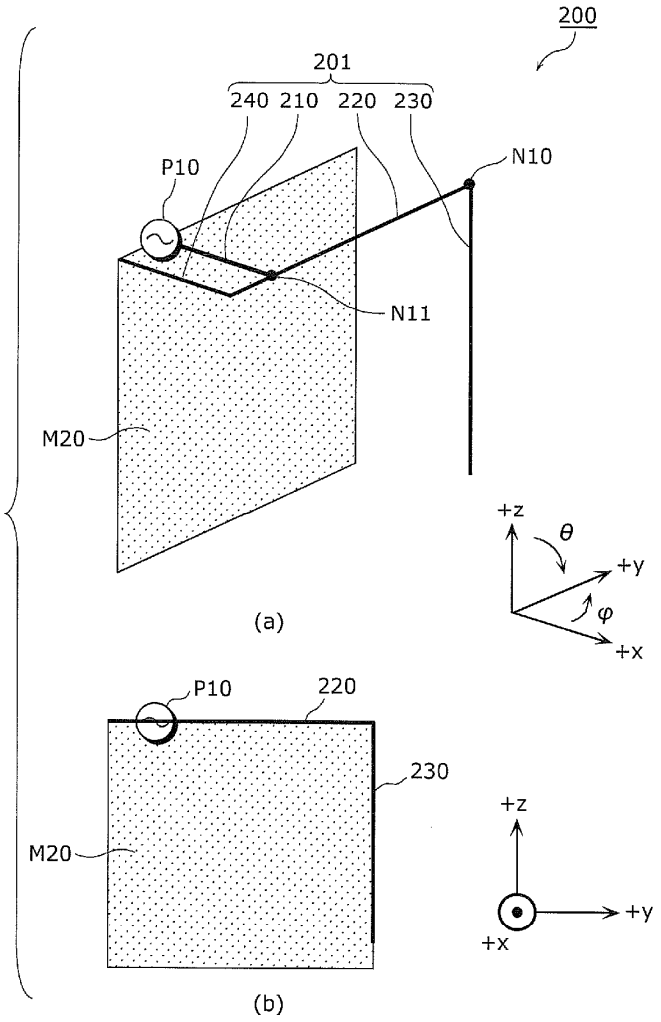
Publication Classification

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

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

(57) **ABSTRACT**

Provided is an antenna including a planar conductor to be grounded, and a three-dimensional linear conductor having at least a linear conductor, another linear conductor, and still another linear conductor that are integrally formed. The linear conductor is provided perpendicularly to the major surface of the planar conductor. The another linear conductor is parallel to the major surface. Still another linear conductor is parallel to the major surface, and is provided perpendicularly to the another linear conductor.



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(19) United States

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KINJOU et al.

(10) Pub. No.: US 2012/0039058 A1

(43) Pub. Date: Feb. 16, 2012

(54) ELECTRONIC APPARATUS

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

(21) Appl. No.: **13/208,165**

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

(30) **Foreign Application Priority Data**

Aug. 11, 2010 (JP) 2010-180591

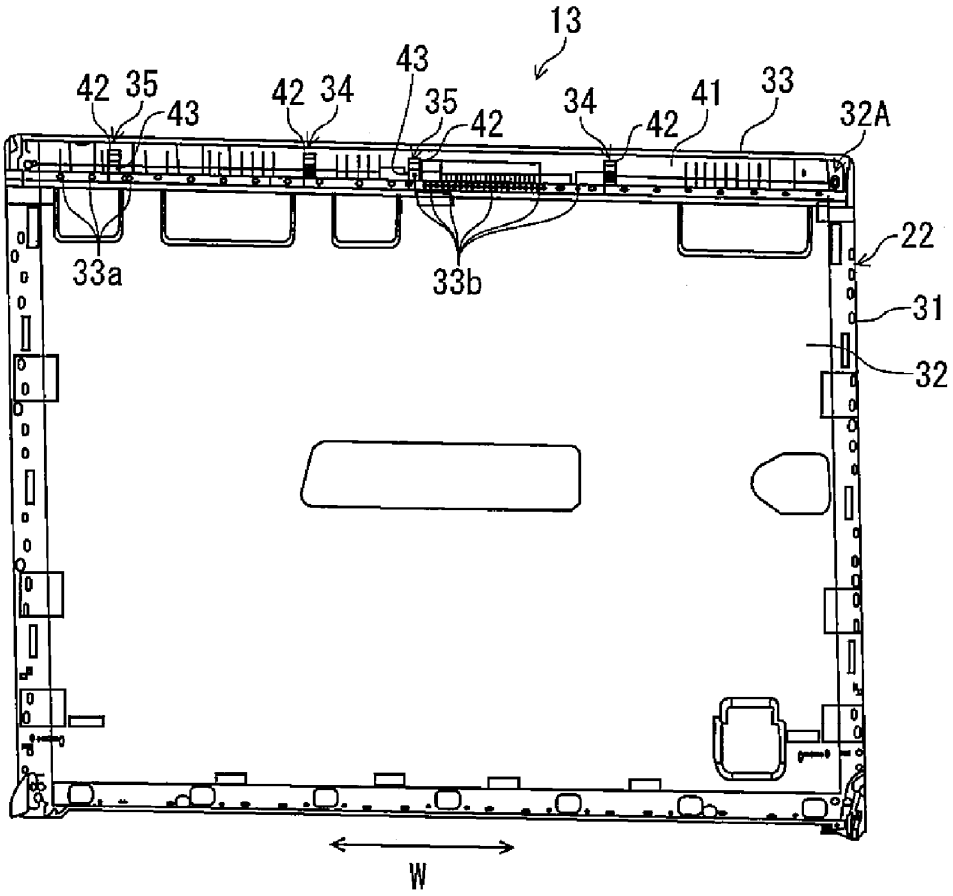
Publication Classification

(51) **Int. Cl.**
H05K 7/02 (2006.01)

(52) **U.S. Cl.** **361/807**

(57) **ABSTRACT**

According to one embodiment, an electronic apparatus includes: an opening portion; a housing provided with a first through hole and a second through hole that are situated near the opening portion, respectively; a display accommodated in the housing; an antenna provided near the opening portion; an antenna cover that covers the opening portion, the first through hole and the second through hole; and a joint portion which joins the housing and the antenna cover, and has a first portion in which a first front end portion protrudes from the first through hole to the housing inside, and a second portion in which a second front end portion is situated in the second through hole.



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(19) **United States**

(12) **Patent Application Publication**

Novotny et al.

(10) **Pub. No.: US 2012/0040127 A1**

(43) **Pub. Date: Feb. 16, 2012**

(54) **STACKED OPTICAL ANTENNA STRUCTURES, METHODS AND APPLICATIONS**

(75) Inventors: **Lukas Novotny**, Pittsford, NY (US); **Wolfgang Dieter Pohl**, Adliswil (CH)

(73) Assignee: **University of Rochester**, Rochester, NY (US)

(21) Appl. No.: **13/208,664**

(22) Filed: **Aug. 12, 2011**

Related U.S. Application Data

(60) Provisional application No. 61/373,470, filed on Aug. 13, 2010.

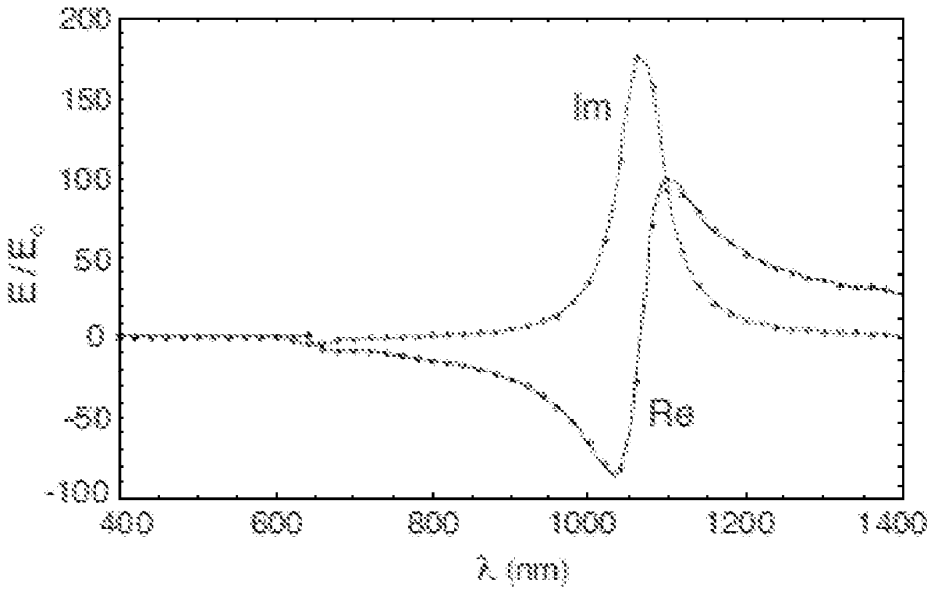
Publication Classification

(51) **Int. Cl.**
B32B 3/00 (2006.01)
B32B 37/00 (2006.01)

(52) **U.S. Cl.** **428/77**; 156/60

(57) **ABSTRACT**

A stacked optical antenna structure includes a stacked structure including: (1) a first antenna arm located over a substrate; (2) an interstitial gap layer located over at least a portion of the first antenna arm; and (3) a second antenna arm located over at least a portion of the interstitial gap layer located over the first antenna arm, and typically incompletely overlapping the first antenna arm. Thus, a gap width of the stacked optical antenna structure is determined by a thickness of the interstitial gap layer rather than a separation distance of antenna arms that may be formed using a photolithographic method. Embodiments also contemplate a method for fabricating the stacked optical antenna that uses the interstitial gap layer as an etch stop layer. The interstitial gap layer may provide any of several functions within the stacked optical antenna structure.



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(19) United States

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(43) Pub. Date: Feb. 16, 2012

Morishita

(54) **PORTABLE TERMINAL**

(75) Inventor: **Katsuji Morishita**, Kanagawa (JP)

(73) Assignee: **KYOCERA CORPORATION**, Kyoto-shi, Kyoto (JP)

(21) Appl. No.: **13/265,397**

(22) PCT Filed: **Apr. 23, 2010**

(86) PCT No.: **PCT/JP2010/057221**

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(30) **Foreign Application Priority Data**

Apr. 24, 2009 (JP) 2009-107183

Publication Classification

(51) **Int. Cl.**
H04W 88/02 (2009.01)

(52) **U.S. Cl.** **455/575.3**

(57) **ABSTRACT**

Provided is a portable terminal which is provided with a first case, a second case, and a connecting section which connects together the first case and the second case, and has less deterioration of antenna sensitivity. The portable terminal has the first case (**2**), the second case (**3**), the connecting section (**4**), a first circuit section (**32**) disposed in the first case (**2**), a first conductive section (**31**) disposed in the first case (**2**), a second conductive section (**33**) disposed in the second case (**3**), a third conductive section (**34**) disposed in the connecting section (**4**), and a first electronic component (**61**) disposed adjacent to the first conductive section (**31**) in the length direction of the first case (**2**) in the first case (**2**). The first length (X**1**), which is obtained from the sum of the path length of the signals in the band of a first frequency (f**1**) in the first conductive section (**31**) and the path length of the signals in the band of the first frequency (f**1**) in the first electronic component (**61**), is substantially the same as the second length (X**2**), which is obtained from the sum of the path length of the signals in the band of the first frequency (f**1**) in the second conductive section (**33**) and the path length of the signals in the band of the first frequency (f**1**) in the third conducive section (**34**).