US 20130127668A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0127668 A1

(43) Pub. Date: May 23, 2013

Ko et al.

(54) **MULTI-BAND ANTENNA**

(75) Inventors: **Ching-hsiang Ko**, New Taipei (TW); **Kai Shih**, New Taipei (TW); **Lan-yung Hsiao**, New Taipei (TW); **Jia-hung Su**, New Taipei (TW)

(73) Assignee: **Cheng Uei Precision Industry Co., LTD.**, New Taipei City (TW)

(21) Appl. No.: **13/301,777**

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

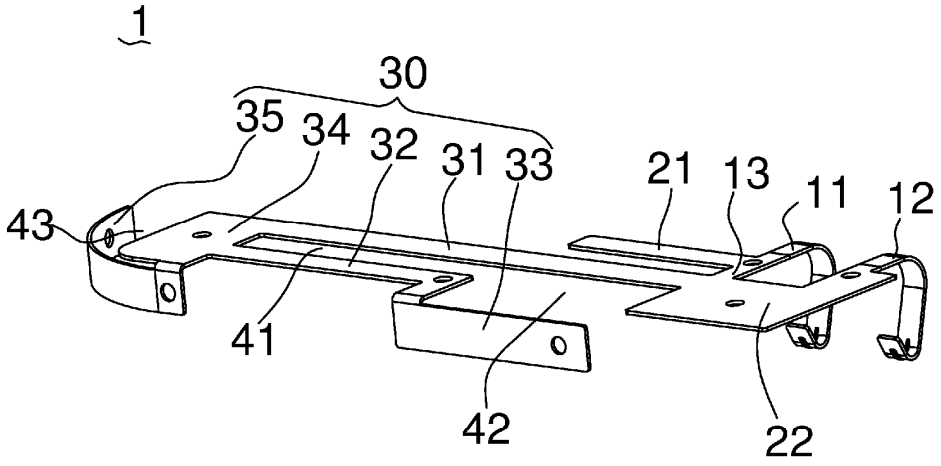
Publication Classification

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

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

(57) **ABSTRACT**

A multi-band antenna is disclosed and comprises a substrate and an electro-conductive layer. The electro-conductive layer comprises: a feed-in terminal; a ground terminal; a connecting portion extended forward from the feed-in terminal; a first high frequency portion extended leftward from the connecting portion for controlling a third frequency band; a low frequency portion bent and extended leftward from the connecting portion for controlling a first frequency band and a second frequency band; and a second high frequency portion extended rightward from the connecting portion for controlling a fourth frequency band. Furthermore, the second high frequency portion is connected with the ground terminal and wider than the first high frequency portion; and harmonic oscillations are generated between the second and first high frequency portions to control a fifth frequency band. Hence, the multi-band antenna of the present invention can meet the requirement of various communication standards.



US 20130127670A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0127670 A1

(43) Pub. Date: May 23, 2013

Desclos et al.

(54) **AUTOMATIC SIGNAL, SAR, AND HAC ADJUSTMENT WITH MODAL ANTENNA USING PROXIMITY SENSORS OR PRE-DEFINED CONDITIONS**

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

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

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

(21) Appl. No.: **13/674,117**

(22) Filed: **Nov. 12, 2012**

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/029,564, filed on Feb. 17, 2011, now Pat. No. 8,362,962, which is a continuation of application No. 12/043,090, filed on Mar. 5, 2008, now Pat. No. 7,911,402.

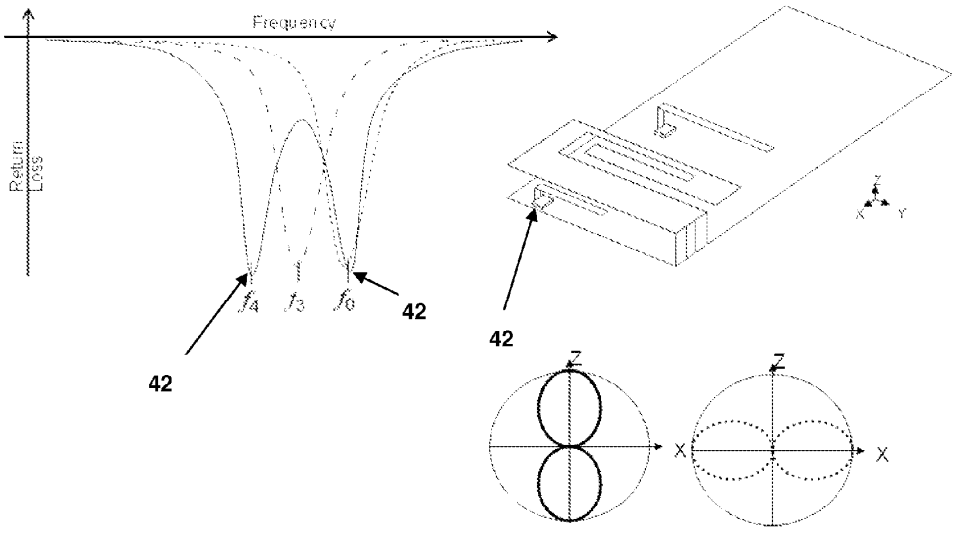
Publication Classification

(51) **Int. Cl.**
H01Q 25/04 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 25/04*** (2013.01)
USPC ..... **343/700 MS**

(57) **ABSTRACT**

A modal adaptive antenna system that dynamically samples proximity sensors or other sensors to determine the use case for the wireless device and then adjust the antenna radiating mode to optimize communication link performance. The modal adaptive antenna system is capable of modifying the antenna radiation pattern to improve communication link quality along with near-field parameters such as SAR and HAC. An algorithm and look-up table containing pre-measured electrical parameters to include TRP, TIS, and SAR are developed and integrated with hardware which includes an antenna and active components to dynamically modify the radiation pattern of the antenna as well as proximity sensors and or other sensing devices.



US 20130127672A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0127672 A1

(43) Pub. Date: May 23, 2013

Zhu et al.

(54) **DISTRIBUTED LOOP ANTENNAS WITH EXTENDED TAILS**

(76) Inventors: **Jiang Zhu**, Sunnyvale, CA (US); **Jerzy Guterman**, Mountain View, CA (US); **Mattia Pascolini**, San Mateo, CA (US); **Robert W. Schlub**, Cupertino, CA (US); **Jayesh Nath**, Santa Clara, CA (US); **Enrique Ayala Vazquez**, Watsonville, CA (US); **Jonathan Haylock**, Los Angeles, CA (US); **Boon W. Shiu**, San Jose, CA (US); **Ruben Caballero**, San Jose, CA (US)

(21) Appl. No.: **13/299,123**

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

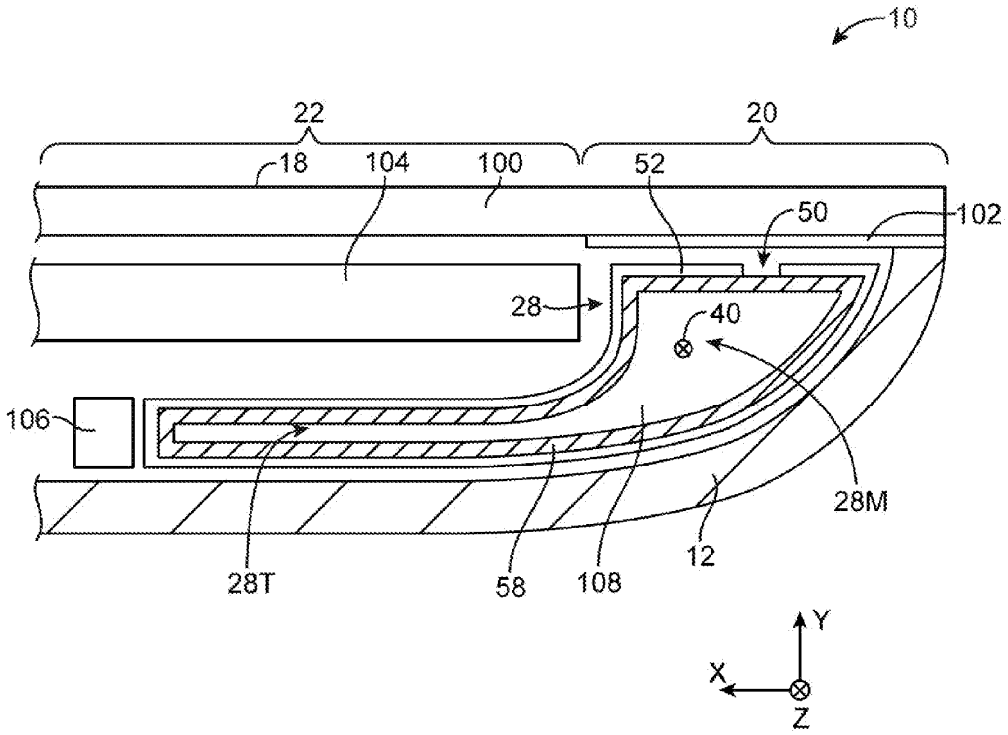
Publication Classification

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

(52) **U.S. Cl.**
USPC **343/702**; 343/866

(57) **ABSTRACT**

Electronic devices may be provided with antenna structures such as distributed loop antenna resonating element structures. A distributed loop antenna may be formed on an elongated dielectric carrier and may have a longitudinal axis. The distributed loop antenna may include a loop antenna resonating element formed from a sheet of conductive material that extends around the longitudinal axis. A gap may be formed in the sheet of conductive material. The gap may be located under an opaque masking layer on the underside of a display cover glass associated with a display. The loop antenna resonating element may have a main body portion that includes the gap and may have an extended tail portion that extends between the display and conductive housing structures. The main body portion and extended tail portion may be configured to ensure that undesired waveguide modes are cut off during operation of the loop antenna.



US 20130127673A1

(19) **United States**

(12) **Patent Application Publication**

CHANG et al.

(10) **Pub. No.: US 2013/0127673 A1**

(43) **Pub. Date: May 23, 2013**

(54) **ELECTRONIC DEVICE WITH MULTI-ANTENNAS**

(75) Inventors: **SHU-WEI CHANG**, Tu-Cheng (TW); **HSIN-HUNG LIU**, Tu-Cheng (TW); **FU-HSIUNG YANG**, Tu-Cheng (TW)

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

(21) Appl. No.: **13/329,232**

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

(30) **Foreign Application Priority Data**

Nov. 17, 2011 (TW) 100141944

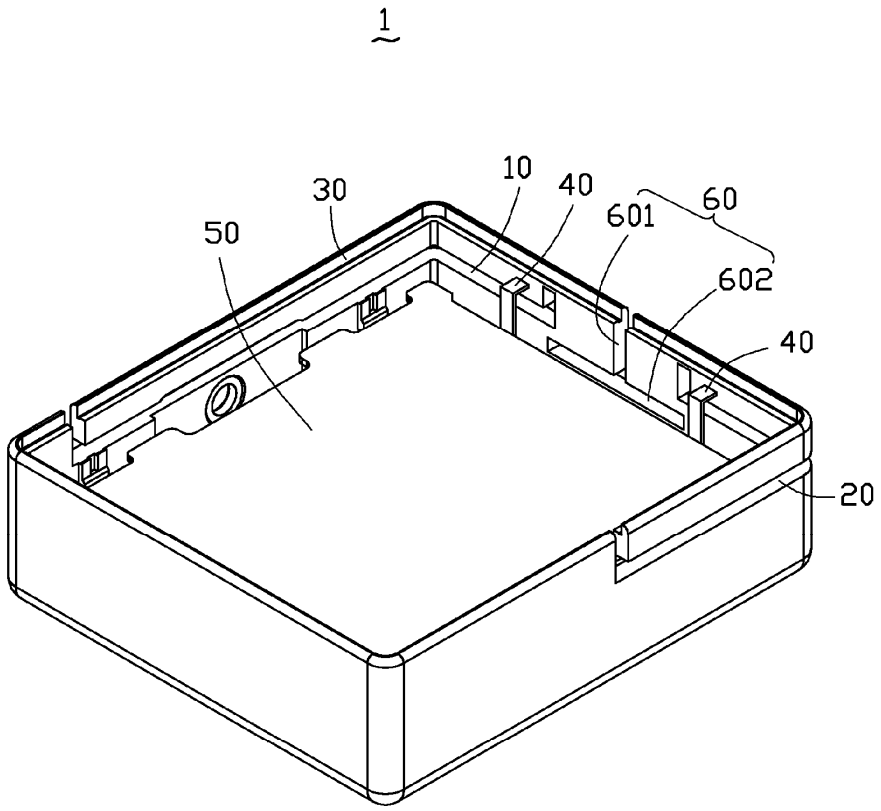
Publication Classification

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

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

(57) **ABSTRACT**

An electronic device includes a first antenna and a second antenna both defined in a housing of the electronic device and respectively connected to a PCB of the electronic device by a component. A slot is defined between the first antenna and the second antenna. The slot forms a capacitor and an inductor to form a filtering circuit for reducing interference between the first antenna and the second antenna.



US 20130127674A1

(19) **United States**

(12) **Patent Application Publication**

Korva

(10) **Pub. No.: US 2013/0127674 A1**

(43) **Pub. Date: May 23, 2013**

(54) **ANTENNA WITH COVER RADIATOR AND METHODS**

(76) Inventor: **Heikki Korva**, Tupos (FI)

(21) Appl. No.: **13/579,559**

(22) PCT Filed: **Feb. 7, 2011**

(86) PCT No.: **PCT/FI2011/050102**

§ 371 (c)(1),
(2), (4) Date: **Jan. 11, 2013**

(30) **Foreign Application Priority Data**

Feb. 18, 2010 (FI) 20105158

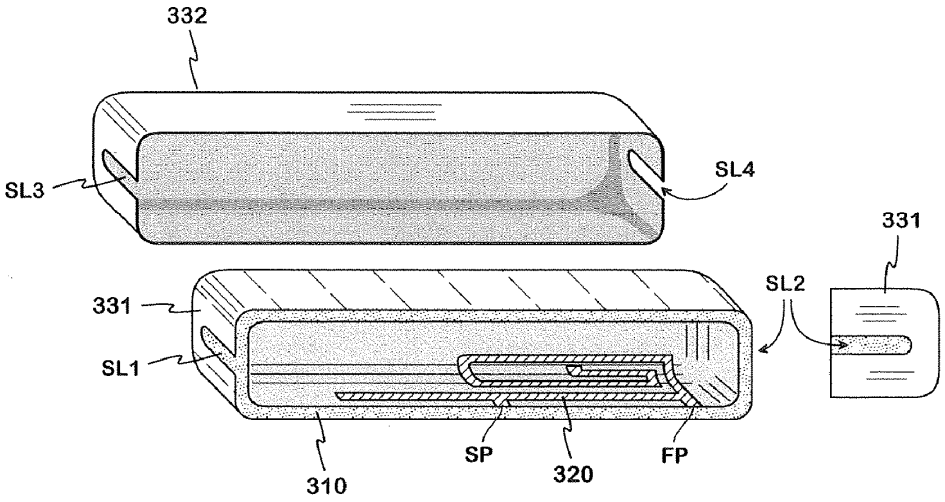
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 1/241*** (2013.01); ***H01Q 5/0003*** (2013.01)
USPC **343/702**

(57) **ABSTRACT**

A monopole antenna applicable especially to small mobile stations. The radiator (**331**) of the antenna is trough-like so that it covers the head surface, front and rear surfaces and both side surfaces of the dielectric cover (**310**) of the radio device at an end of the device. On the side of the side surfaces there are slots (SL**1**, SL**2**) in the radiator starting from its edge for increasing the electric size. The radiator is fed electromagnetically by a separate element (**320**) which is shaped so that the antenna has at least two operating bands. The ground plane of the antenna is apart from the radiator, thus not extending inside the 'trough'.



US 20130127677A1

(19) **United States**

(12) **Patent Application Publication**

Lin et al.

(10) **Pub. No.: US 2013/0127677 A1**

(43) **Pub. Date: May 23, 2013**

(54) **RADIO-FREQUENCY DEVICE AND WIRELESS COMMUNICATION DEVICE**

(76) Inventors: **Hsiao-Yi Lin**, Hsinchu (TW); **Jhih-Yuan Ke**, Hsinchu (TW); **Chih-Ming Wang**, Hsinchu (TW)

(21) Appl. No.: **13/350,842**

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

(30) **Foreign Application Priority Data**

Nov. 17, 2011 (TW) 100142160
Dec. 20, 2011 (TW) 100147446

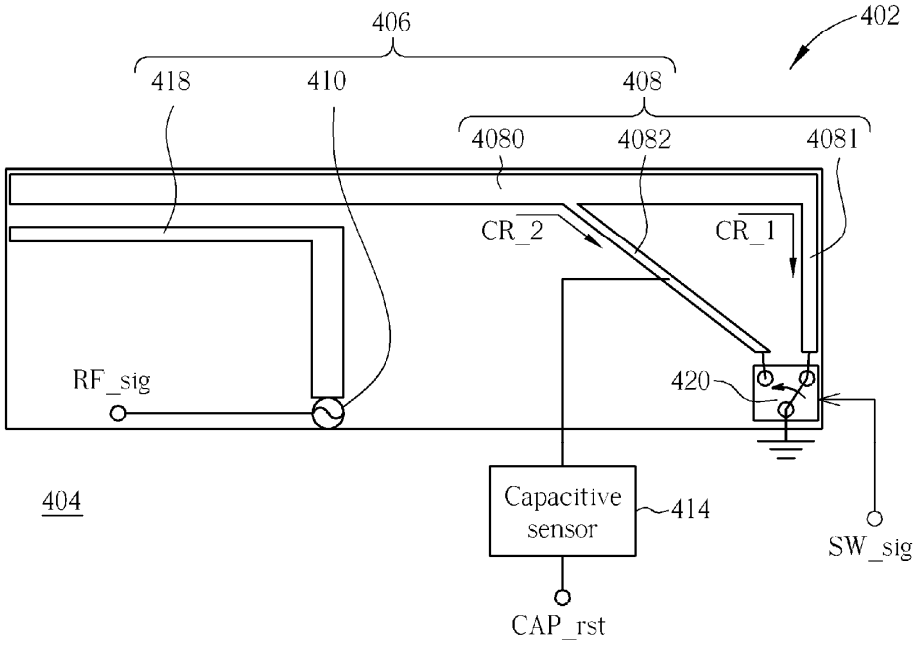
Publication Classification

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

(52) **U.S. Cl.**
USPC **343/722**

(57) **ABSTRACT**

The present invention discloses an RF device for a wireless communication device, including a grounding element, an antenna, including a radiating element, a feed-in element, a coupling element, a switch, coupled between the coupling element and the grounding element, for connecting or disconnecting the grounding element to the coupling element, such that the antenna respectively operates in a first frequency band and a second frequency band, and a grounding terminal, for coupling the grounding element, a capacitive sensing element, for sensing an environment capacitance within a specific range through the radiating element, at least one capacitor, for blocking a DC route from the grounding terminal to the grounding element.



US 20130127681A1

(19) **United States**

(12) **Patent Application Publication**

SOMEYA

(10) **Pub. No.: US 2013/0127681 A1**

(43) **Pub. Date: May 23, 2013**

(54) **ANTENNA, RADIO RECEIVER AND METHOD FOR MANUFACTURING ANTENNA**

(71) Applicant: **Casio Computer Co., Ltd.**, Tokyo (JP)

(72) Inventor: **Kaoru SOMEYA**, Tokyo (JP)

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

(21) Appl. No.: **13/677,602**

(22) Filed: **Nov. 15, 2012**

(30) **Foreign Application Priority Data**

Nov. 18, 2011 (JP) 2011-252158

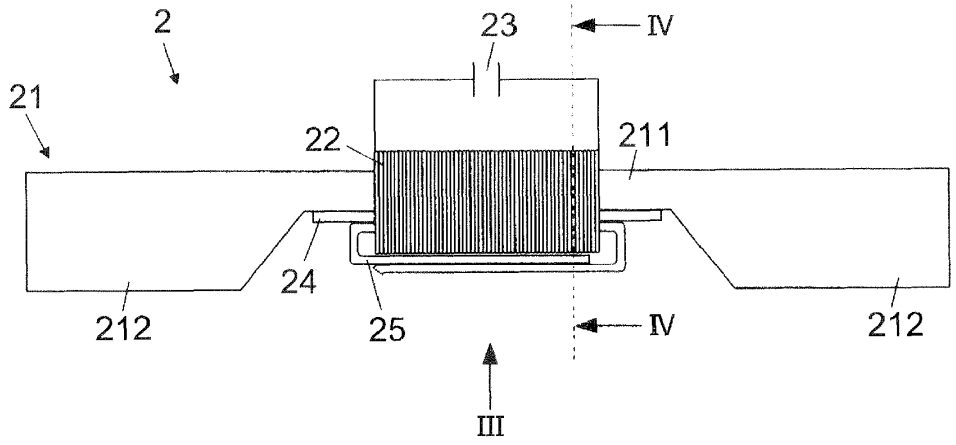
Publication Classification

(51) **Int. Cl.**
H01Q 7/08 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 7/08*** (2013.01)
USPC **343/788**; 29/600

(57) **ABSTRACT**

An antenna includes an elongated magnetic core, a secondary magnetic path member, a spacer and a coil. The secondary magnetic path member is disposed near the core, and forms a secondary magnetic path. The spacer is disposed between the core and the secondary magnetic path member so as to prevent the core and the secondary magnetic path member from being magnetically coupled. The coil is formed by winding a wire around the core in such a way as to bundle the core and the secondary magnetic path member together.



US 20130127684A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0127684 A1

(43) Pub. Date: May 23, 2013

Li et al.

(54) **PLASTIC UNIT INTERNALLY EMBEDDED WITH ANTENNA AND MANUFACTURING METHOD OF THE SAME**

(75) Inventors: **Hsin-Hsien Li**, Taoyuan County (TW); **Hsin-Ying Wu**, Taoyuan County (TW)

(73) Assignee: **Jentech Precision Industrial Co., LTD.**, Gueishan (TW)

(21) Appl. No.: **13/488,814**

(22) Filed: **Jun. 5, 2012**

(30) **Foreign Application Priority Data**

Nov. 23, 2011 (TW) 100142938

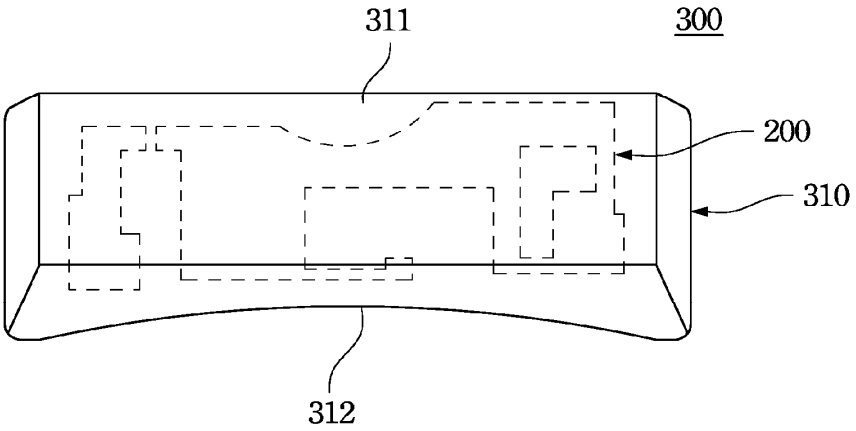
Publication Classification

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

(52) **U.S. Cl.**
USPC **343/873**

(57) **ABSTRACT**

The present invention provides a plastic unit internally embedded with an antenna and a manufacturing method of the same. The manufacturing method comprises the steps of preparing a plastic housing, installing an antenna metal wiring on the plastic housing, and covering a heated and softened thermoplastic material on the antenna metal wiring and the plastic housing. The cooled thermoplastic material and the plastic housing are combined as a plastic member. The antenna metal wiring is internally embedded in the plastic member.



US 20130127685A1

(19) **United States**

(12) **Patent Application Publication**

Ikehata

(10) **Pub. No.: US 2013/0127685 A1**

(43) **Pub. Date: May 23, 2013**

(54) **ANTENNA DEVICE**

(75) Inventor: **Kazuhiko Ikehata**, Osaka-shi (JP)

(73) Assignee: **SHARP KABUSHIKI KAISHA**, Osaka-shi, Osaka (JP)

(21) Appl. No.: **13/812,572**

(22) PCT Filed: **Aug. 30, 2011**

(86) PCT No.: **PCT/JP2011/069563**

§ 371 (c)(1),
(2), (4) Date: **Jan. 28, 2013**

(30) **Foreign Application Priority Data**

Aug. 30, 2010 (JP) 2010-192827

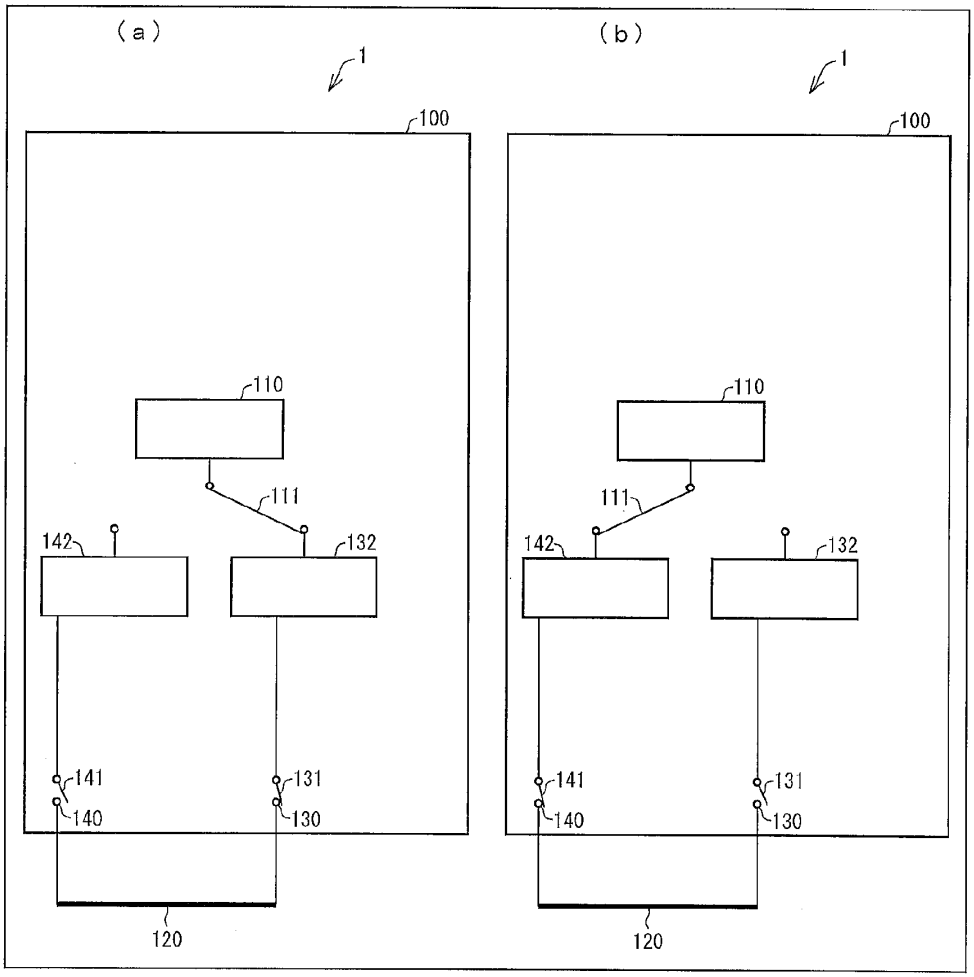
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 3/247*** (2013.01)
USPC **343/876**

(57) **ABSTRACT**

Provided is an antenna device (**1**) including: an antenna element (**120**); a substrate (**100**) on which a ground conductor is provided; a first feeding portion (**130**); a second feeding portion (**140**); and a switching section (**111**, **131**, **141**). A direction in which high frequency electric current mainly flows in the ground conductor is different from while the first feeding portion (**130**) feeds the antenna element (**120**) to while the second feeding portion (**140**) feeds the antenna element (**120**).



US 20130135149A1

(19) **United States**

(12) **Patent Application Publication**

KO et al.

(10) **Pub. No.: US 2013/0135149 A1**

(43) **Pub. Date: May 30, 2013**

(54) **BROADBAND PRINTED ANTENNA**

(75) Inventors: **CHING-HSIANG KO**, New Taipei (TW); **Kai Shih**, New Taipei (TW); **Jia-hung Su**, New Taipei (TW)

(73) Assignee: **Cheng Uei Precision Industry Co., LTD.**, New Taipei City (TW)

(21) Appl. No.: **13/304,606**

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

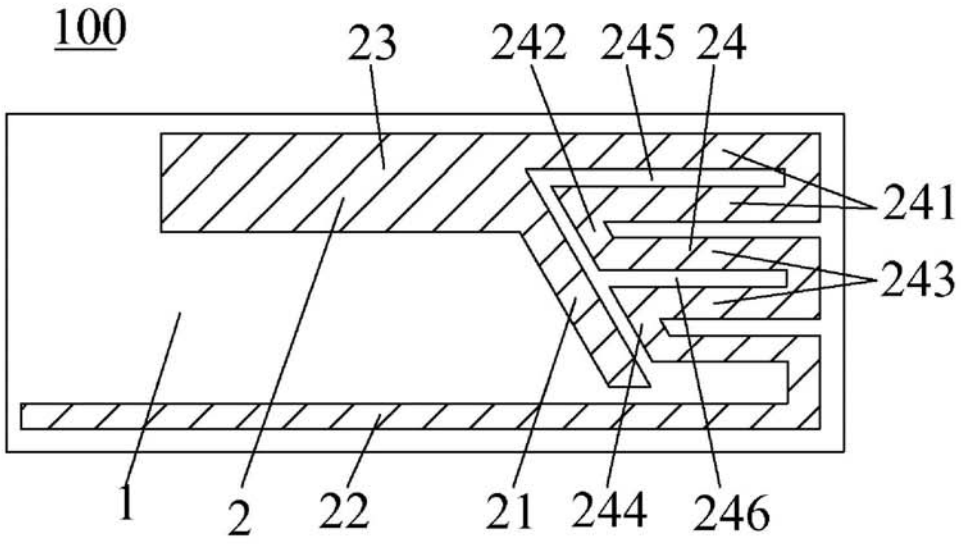
Publication Classification

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

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

(57) **ABSTRACT**

The present invention discloses a broadband printed antenna used in a notebook for receiving and emitting electromagnetic wave signals. The broadband printed antenna includes a substrate and a conductive layer formed on a front face of the substrate. The conductive layer includes a feeding portion for transmitting electromagnetic wave signals, a radiation portion extending leftward along an end of the feeding porting, a short portion being bent and spiral and extending rightward along the end of the feeding portion, and a ground portion extending along the short portion. The present invention includes the short portion being bent and spiral at the right side of the feeding portion for compensating a band of the notebook so that the band can reach 2.3 GHz-2.7 GHz, thereby meets various requirements of communication standards.



US 20130135153A1

(19) **United States**

(12) **Patent Application Publication**

Wang et al.

(10) **Pub. No.: US 2013/0135153 A1**

(43) **Pub. Date: May 30, 2013**

(54) **DUAL FEED PORT DUAL BAND ANTENNA ASSEMBLY AND ASSOCIATED METHOD**

(71) Applicant: **Research In Motion Limited**, Waterloo (CA)

(72) Inventors: **Dong Wang**, Waterloo (CA); **Qinjiang Rao**, Waterloo (CA)

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

(21) Appl. No.: **13/751,521**

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

Related U.S. Application Data

(63) Continuation of application No. 12/683,965, filed on Jan. 7, 2010, now Pat. No. 8,390,519.

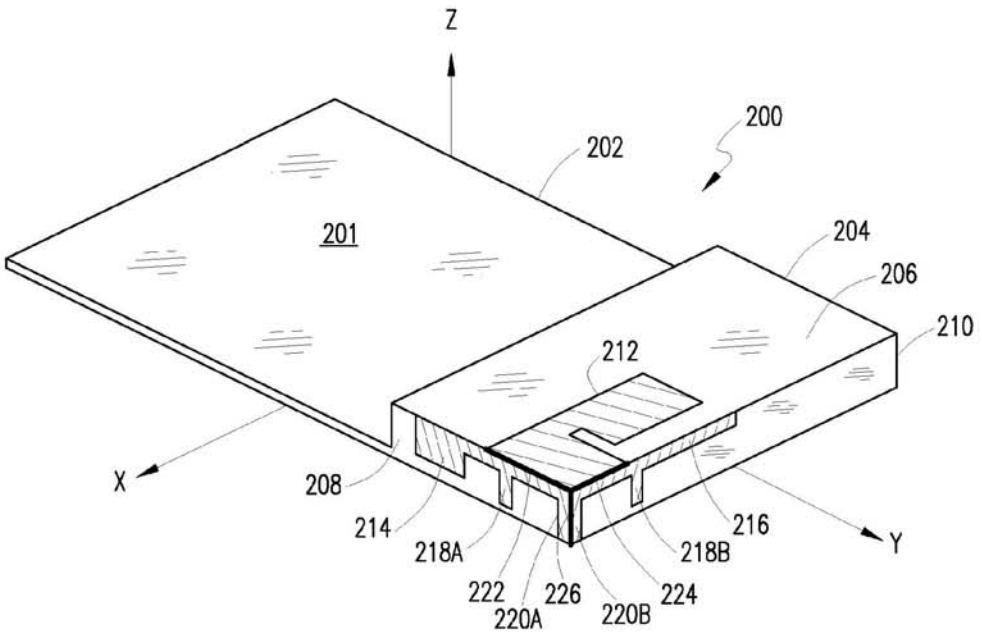
Publication Classification

(51) **Int. Cl.**
H01Q 1/38 (2006.01)
H01Q 9/06 (2006.01)

(52) **U.S. Cl.**
CPC ... ***H01Q 1/38*** (2013.01); ***H01Q 9/06*** (2013.01)
USPC ..... **343/700 MS**; 29/600

(57) **ABSTRACT**

A dual feed port dual band (DFDB) antenna module comprising a first antenna element disposed on a first planar surface, a second antenna element disposed on a second planar surface, and a third antenna element disposed on a third planar surface. A first feed port is coupled to a first transceiver circuit adapted to operate in a first band and a second feed port is coupled to a second transceiver circuit adapted to operate in the first band and to a receiver circuit adapted to operate in a second band. The first and second feed ports are oriented substantially orthogonal with respect to each other.



US 20130135155A1

(19) **United States**

(12) **Patent Application Publication**

Zhang

(10) **Pub. No.: US 2013/0135155 A1**

(43) **Pub. Date: May 30, 2013**

(54) **QUAD-BAND INTERNAL ANTENNA AND MOBILE COMMUNICATION TERMINAL THEREOF**

(75) Inventor: **Lian Zhang**, Huizhou (CN)

(73) Assignee: **HUIZHOU TCL MOBILE COMMUNICATION CO., LTD**, HUIZHOU, GUANGDONG (CN)

(21) Appl. No.: **13/816,214**

(22) PCT Filed: **Nov. 4, 2011**

(86) PCT No.: **PCT/CN2011/081780**

§ 371 (c)(1),
(2), (4) Date: **Feb. 8, 2013**

(30) **Foreign Application Priority Data**

Dec. 1, 2010 (CN) 201010568426.9

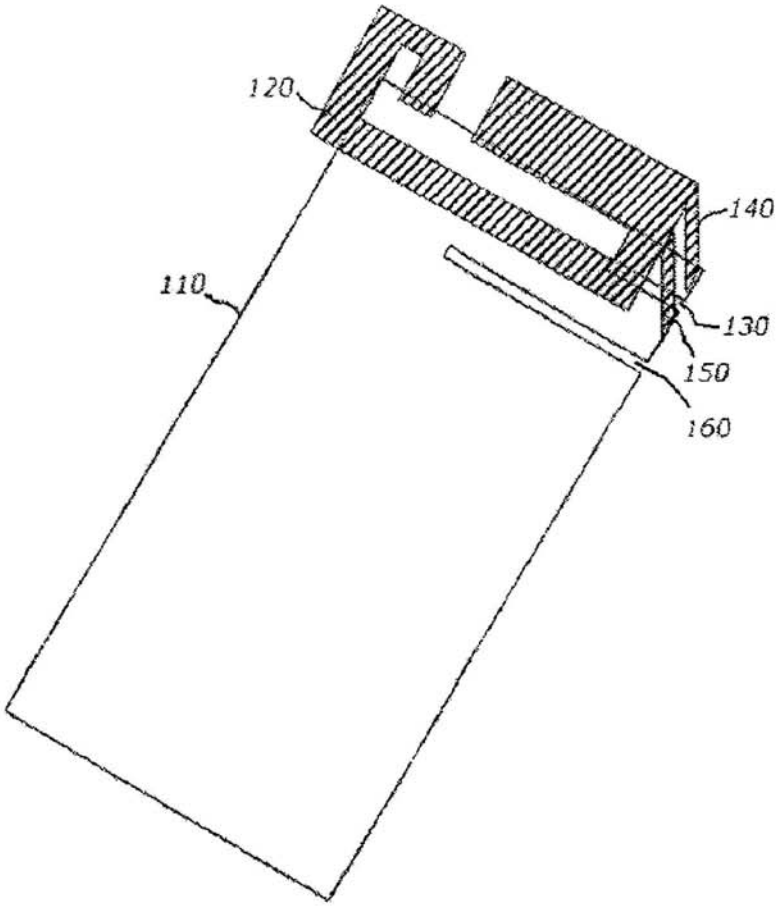
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 9/04*** (2013.01)
USPC ..... **343/700 MS**

(57) **ABSTRACT**

A quad-band internal antenna may include an antenna radiating element, a first slotted hole and a second slotted hole arranged on a printed circuit board. The first slotted hole may be arranged along a direction perpendicular to the current flow direction of the printed circuit board, and the second slotted hole may be arranged between a ground pin and a feed pin of the antenna radiating element, such that the first slotted hole and the second slotted hole are both open slotted holes.



US 20130135156A1

(19) **United States**

(12) **Patent Application Publication**

Tsai et al.

(10) **Pub. No.: US 2013/0135156 A1**

(43) **Pub. Date: May 30, 2013**

(54) **MULTI-BAND ANTENNA FOR PORTABLE COMMUNICATION DEVICE**

(75) Inventors: **Tiao-Hsing Tsai**, Taoyuan City (TW); **Chi-Yin Fang**, Taoyuan City (TW); **Chao-Hsu Wu**, Taoyuan City (TW); **Tsung-Ming Kuo**, Taoyuan City (TW); **Chun-Yuan Wang**, Taoyuan City (TW); **Chien-Pin Chiu**, Taoyuan City (TW)

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

(21) Appl. No.: **13/304,722**

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

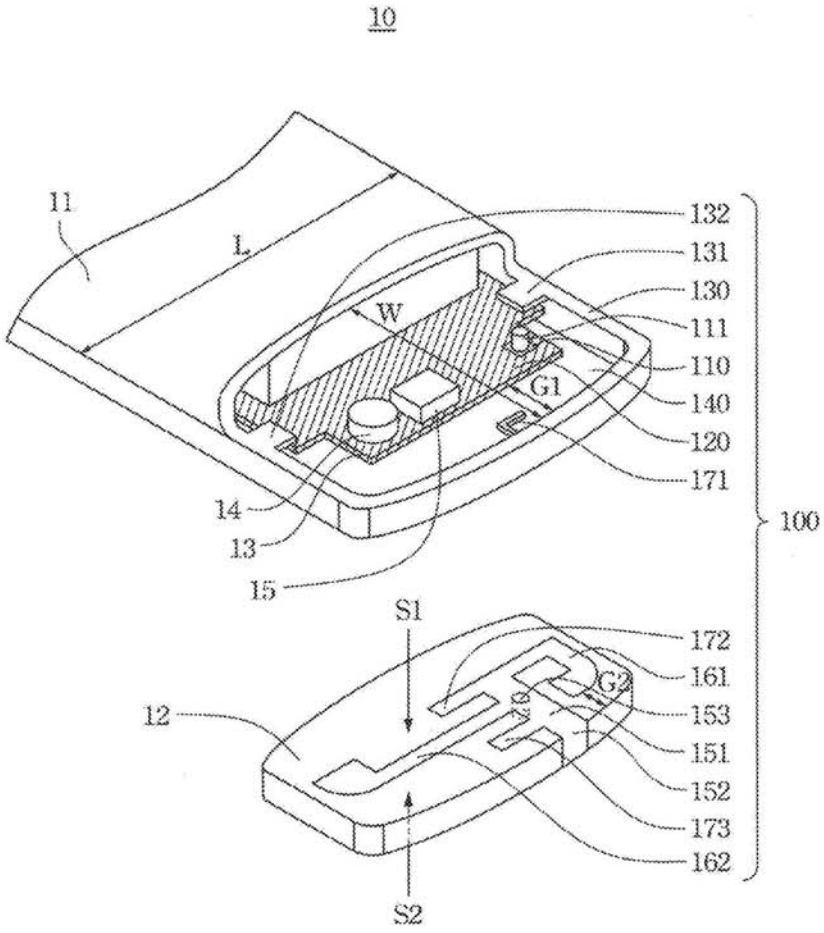
Publication Classification

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

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

(57) **ABSTRACT**

A multi-band antenna for a portable communication device is disclosed, in which the communication device includes a first housing, a second housing and a substrate. The multi-band antenna includes a feeding portion, a system ground plane, a metal ring, a resonant cavity, a first and a second radiating portion. The system ground plane is disposed on the substrate. The metal ring is connected to the first housing, and forms a space with the first housing to accommodate the substrate, in which the metal ring is electrically coupled to the system ground plane through a plurality of ground ends. The resonant cavity is formed between the system ground plane and the metal ring to generate a first resonant mode. The first and the second radiating portion are disposed on the second housing, for generating a second and a third resonant mode, respectively.



US 20130135157A1

(19) **United States**

(12) **Patent Application Publication**

Tsou et al.

(10) **Pub. No.: US 2013/0135157 A1**

(43) **Pub. Date: May 30, 2013**

(54) **PORTABLE COMMUNICATION DEVICE**

(75) Inventors: **Tun-Yuan Tsou**, Taoyuan City (TW); **Pei-Ling Teng**, Taoyuan City (TW); **Yi-Chun Chen**, Taoyuan City (TW); **Hong-Lung Chen**, Taoyuan City (TW); **Kuo-Cheng Chen**, Taoyuan City (TW)

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

(21) Appl. No.: **13/304,726**

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

Publication Classification

(51) **Int. Cl.**

H01Q 1/24 (2006.01)

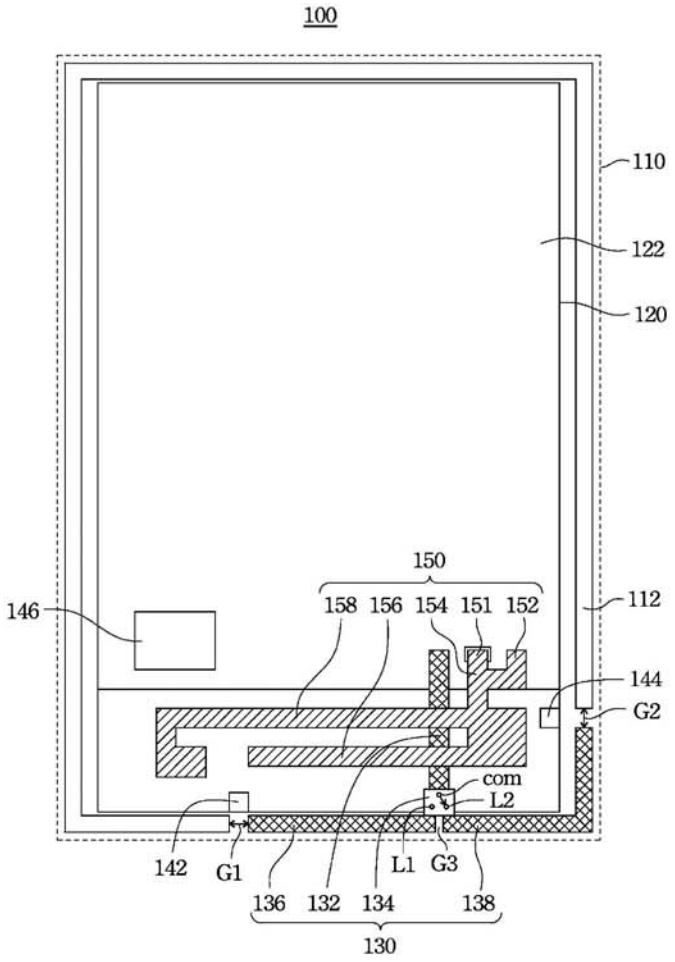
H01Q 21/00 (2006.01)

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

USPC **343/702**; 343/876; 343/725; 343/728

(57) **ABSTRACT**

A portable communication device includes an appearance, a substrate and a switchable resonant antenna. The substrate is disposed in the appearance, and the substrate has a ground plane. The switchable resonant antenna comprises a first connection portion, a switching unit, a first metal element and a second metal element, where the first connection portion is electrically coupled between the ground plane and the switching unit, the switching unit is configured to electrically couple the first connection portion to the first metal element or the second metal element according to a control signal generated corresponding to a detecting result, in order to generate a first resonant mode.



US 20130135158A1

(19) **United States**

(12) **Patent Application Publication**

Faraone et al.

(10) **Pub. No.: US 2013/0135158 A1**

(43) **Pub. Date: May 30, 2013**

(54) **UNINTERRUPTED BEZEL ANTENNA**

(75) Inventors: **Antonio Faraone**, Fort Lauderdale, FL (US); **Giorgi G. Bit-Babik**, Sunrise, FL (US)

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

(21) Appl. No.: **13/308,100**

(22) Filed: **Nov. 30, 2011**

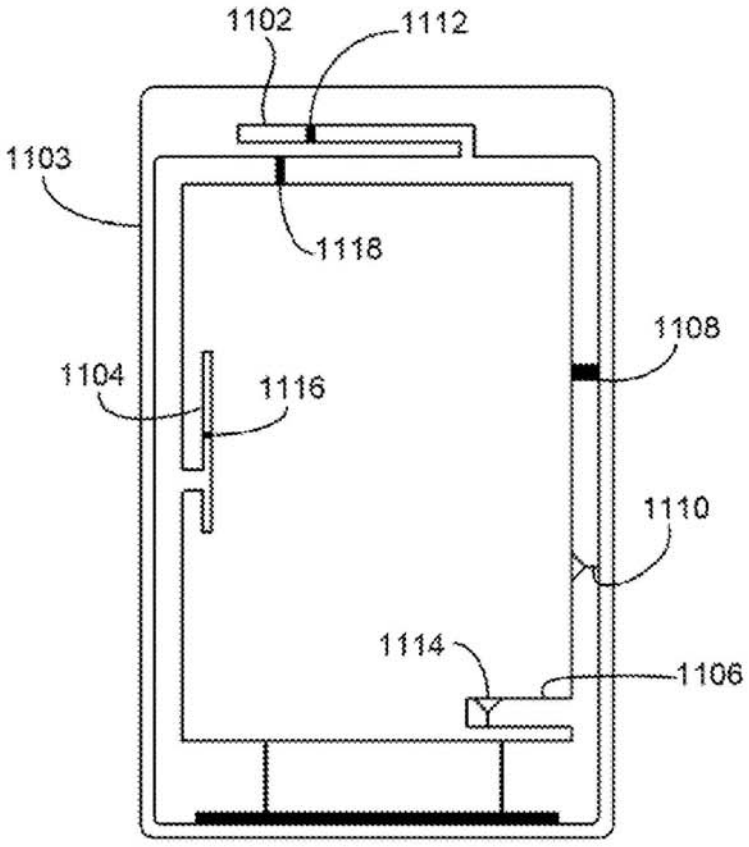
Publication Classification

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

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

(57) **ABSTRACT**

A bezel forms a continuous, uninterrupted outer perimeter around the outside of a handheld radio device. The bezel is made of an electrically conductive material and is used as an antenna element. The bezel can be operated in either a common excitation mode or a differential excitation mode, depending on whether a user is presently holding the device, and making contact with the bezel.



US 20130135162A1

(19) **United States**

(12) **Patent Application Publication**

Shamblin et al.

(10) **Pub. No.: US 2013/0135162 A1**

(43) **Pub. Date: May 30, 2013**

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

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

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

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

(21) Appl. No.: **13/622,356**

(22) Filed: **Sep. 18, 2012**

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/029,564, filed on Feb. 17, 2011, now Pat. No. 8,362,962.

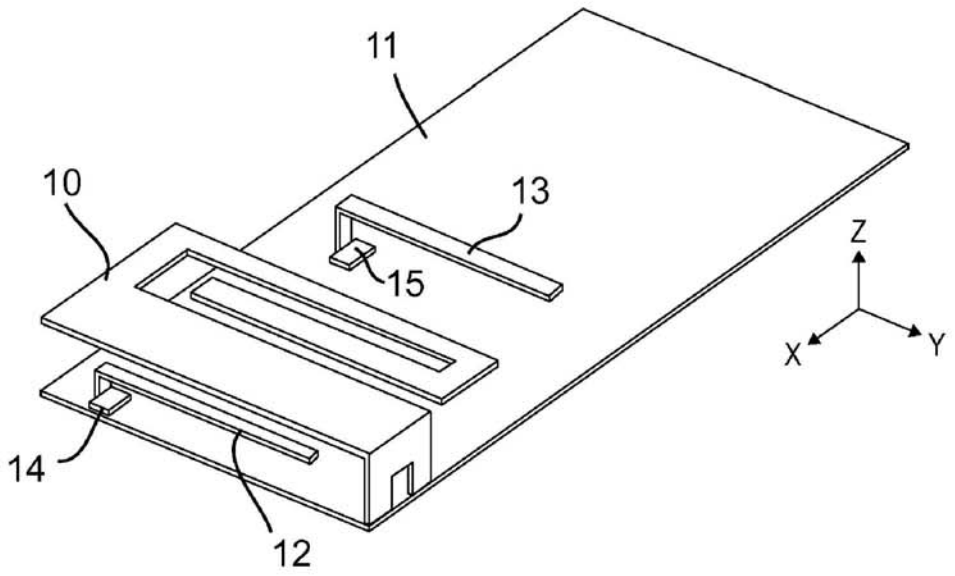
Publication Classification

(51) **Int. Cl.**
H01Q 9/06 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 9/06*** (2013.01)
USPC **343/745**

(57) **ABSTRACT**

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



US 20130135164A1

(19) **United States**

(12) **Patent Application Publication**

Asanuma et al.

(10) **Pub. No.: US 2013/0135164 A1**

(43) **Pub. Date: May 30, 2013**

(54) **SMALL ANTENNA APPARATUS OPERABLE IN MULTIPLE BANDS**

(76) Inventors: **Kenichi Asanuma**, Kyoto (JP); **Atsushi Yamamoto**, Kyoto (JP); **Tsutomu Sakata**, Osaka (JP)

(21) Appl. No.: **13/814,833**

(22) PCT Filed: **Jan. 31, 2012**

(86) PCT No.: **PCT/JP2012/000617**

§ 371 (c)(1),
(2), (4) Date: **Feb. 7, 2013**

(30) **Foreign Application Priority Data**

Jul. 11, 2011 (JP) 2011-152744

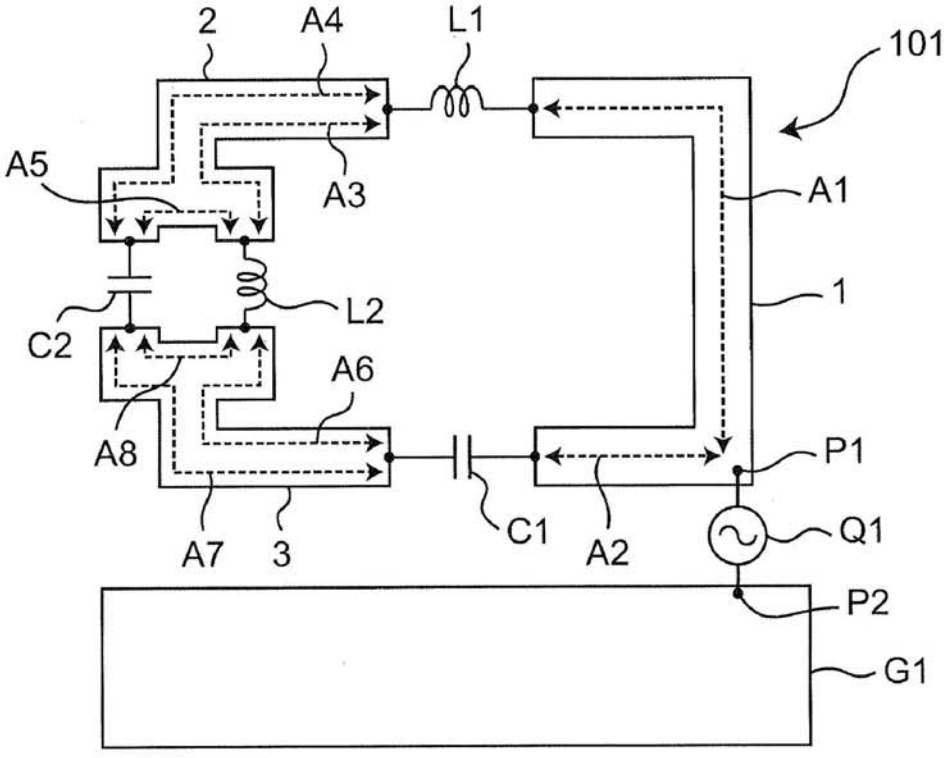
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 5/0034*** (2013.01)
USPC **343/749**

(57) **ABSTRACT**

In a radiator, a large loop is formed by radiation conductors, first and second capacitors, and first and second inductors, and a small loop is formed by portions of the radiation conductors close to each other, the second capacitor, and the second inductor. The radiator is configured such that its first portion, second portion, and third portion resonate at predetermined frequencies, respectively. The first portion extends along the large loop, and includes the first inductor, the first capacitor, and one of the second inductor and the second capacitor. The second portion includes a section extending from a feed point to a second position through one of the first inductor and the first capacitor, and includes the small loop. The third portion includes a section extending from the feed point to the second position through the first capacitor.



US 20130135167A1

(19) **United States**

(12) **Patent Application Publication**

Tsai et al.

(10) **Pub. No.: US 2013/0135167 A1**

(43) **Pub. Date: May 30, 2013**

(54) **ANTENNA MODULE**

(76) Inventors: **Wen-Yi Tsai**, New Taipei City (TW); **Kuan-Jen Chung**, New Taipei City (TW); **Chia-Wei Su**, New Taipei City (TW)

(21) Appl. No.: **13/364,294**

(22) Filed: **Feb. 1, 2012**

(30) **Foreign Application Priority Data**

Nov. 25, 2011 (TW) 100222335

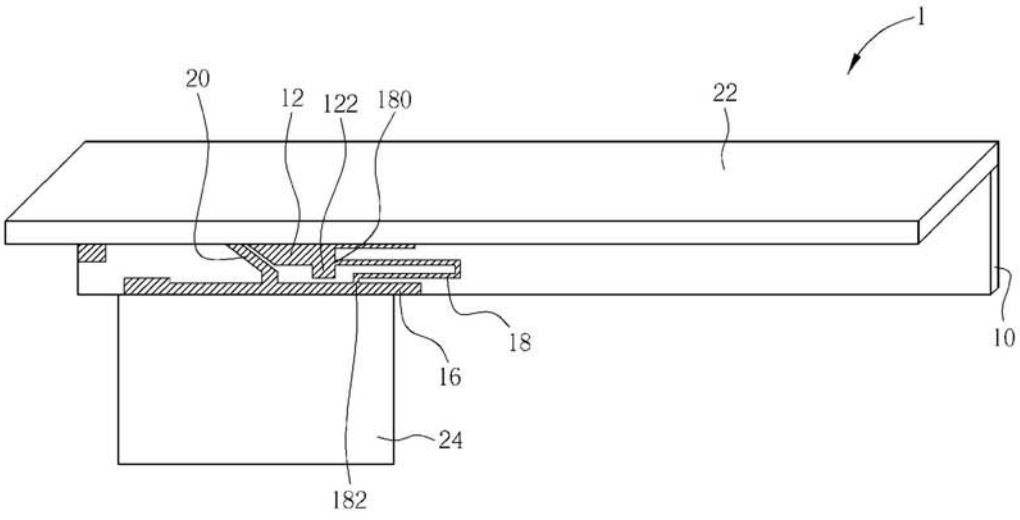
Publication Classification

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

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

(57) **ABSTRACT**

An antenna module includes a substrate, a main radiation structure, a strip-shaped radiation structure, a grounding structure, a shorting structure, a parasitic radiation structure and a metal radiation member. An acute angle is included between a first edge of the main radiation structure and a longitudinal edge of the substrate. The main radiation structure has a signal feeding portion and a connecting portion. The strip-shaped radiation structure is extended from a second edge of the main radiation structure. The shorting structure is U-shaped. A first end of the shorting structure is connected to the signal feeding portion and a second end of the shorting structure is connected to the grounding structure. The parasitic radiation structure is extended from the grounding structure and parallel to the first edge. A constant distance is between the parasitic radiation structure and the first edge. The metal radiation member is connected to the connecting portion.



US 20130135168A1

(19) **United States**

(12) **Patent Application Publication**

Kim et al.

(10) **Pub. No.: US 2013/0135168 A1**

(43) **Pub. Date: May 30, 2013**

(54) **MIMO ANTENNA FOR IMPROVED ISOLATION**

(75) Inventors: **Jin-Myung Kim**, Incheon (KR); **Chang-Won Jung**, Seoul (KR); **In-Su Yeom**, Seoul (KR)

(73) Assignees: **SEOUL MATIONAL UNIVERSITY OF TECHNOLOGY CENTER FOR INDUSTRY COLLABORATION**, Seoul (KR); **MOBITECH CORP**, Seoul (KR)

(21) Appl. No.: **13/643,987**

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

(86) PCT No.: **PCT/KR2011/003138**

§ 371 (c)(1),
(2), (4) Date: **Jan. 14, 2013**

(30) **Foreign Application Priority Data**

Apr. 28, 2010 (KR) 10-2010-0039611

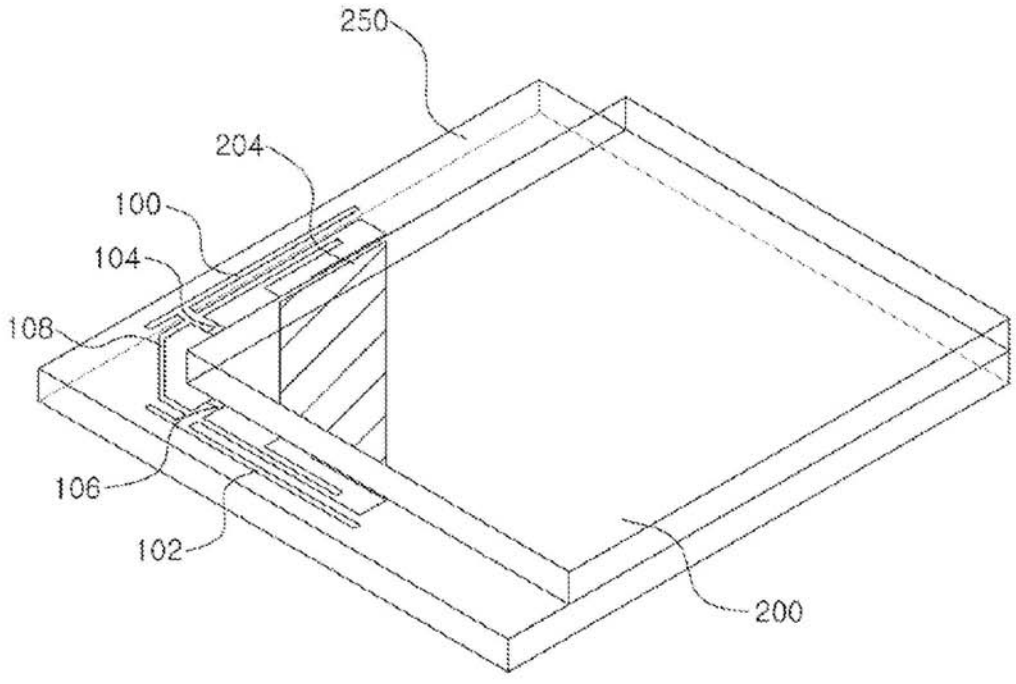
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 1/521*** (2013.01)
USPC **343/841**

(57) **ABSTRACT**

A MIMO antenna for improving isolation is disclosed. The disclosed antenna includes a dielectric feature; a ground plane included in a first layer of the dielectric feature; a first radiator, which is electromagnetically joined with a first feed point, configured to radiate a first RF signal, and joined with the ground plane; a second radiator, which is electromagnetically joined with a second feed point, configured to radiate a second RF signal, and joined with the ground plane; and a connector line, which is joined with a particular point of the first radiator and with a particular point of the second radiator to connect the first radiator with the second radiator. The disclosed antenna can improve isolation properties between multiple antennas and can ensure adequate isolation properties even when the distances between multiple antennas are set to be relatively small.



US 20130135170A1

(19) **United States**

(12) **Patent Application Publication**

KO et al.

(10) **Pub. No.: US 2013/0135170 A1**

(43) **Pub. Date: May 30, 2013**

(54) **PRINTED ANTENNA**

(75) Inventors: **CHING-HSIANG KO**, New Taipei (TW); **Kai Shih**, New Taipei (TW); **Lan-yung Hsiao**, New Taipei (TW); **Jia-hung Su**, New Taipei (TW)

(73) Assignee: **Cheng Uei Precision Industry Co., LTD.**, New Taipei City (TW)

(21) Appl. No.: **13/304,394**

(22) Filed: **Nov. 24, 2011**

Publication Classification

(51) **Int. Cl.**

H01Q 1/38 (2006.01)

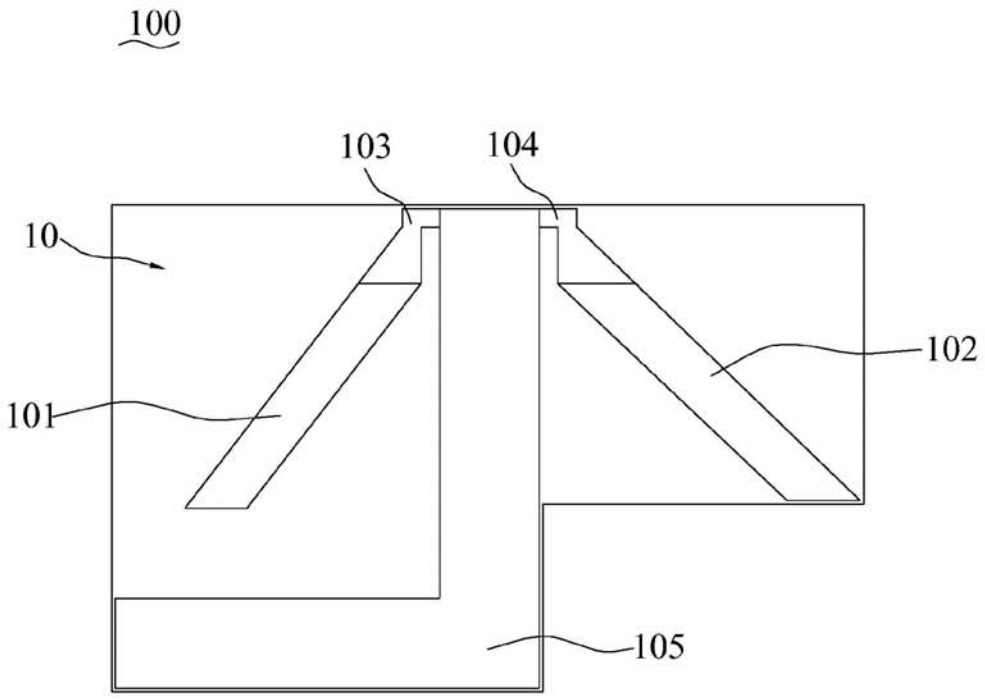
H01Q 1/48 (2006.01)

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

USPC ..... **343/848**; 343/700 MS

(57) **ABSTRACT**

A printed antenna is disclosed. The printed antenna includes a substrate and an electrically conductive layer formed on a top surface of the substrate. The electrically conductive layer comprises a first radiation part, a second radiation part, a first feed part, a second feed part, and a grounding part. The first radiation part is connected with the first feed part. The second radiation part is connected with the second feed part. The grounding part is connected with the first radiation part and the second radiation part. In the printed antenna of the present invention, the first feed part and the second feed part feed into two electromagnetic signals so as to implement a dual antenna function. Furthermore, the arrangement is reasonable, and the manufacturing cost is low.



US 20130135171A1

(19) **United States**

(12) **Patent Application Publication**

Desclos et al.

(10) **Pub. No.: US 2013/0135171 A1**

(43) **Pub. Date: May 30, 2013**

(54) **ACTIVE SELF-RECONFIGURABLE MULTIMODE ANTENNA SYSTEM**

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

(72) Inventors: **Laurent Desclos**, San Diego, CA (US); **Jeffrey Shamblin**, San Marcos, CA (US); **Barry Matsumori**, La Jolla, CA (US)

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

(21) Appl. No.: **13/674,112**

(22) Filed: **Nov. 12, 2012**

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/029,564, filed on Feb. 17, 2011, now Pat. No. 8,362,962, which is a continuation of application No. 12/043,090, filed on Mar. 5, 2008, now Pat. No. 7,911,402, Continuation-in-part of application No. 13/289,901, filed on Nov. 4, 2011, which is a continuation of application No. 12/894,052, filed on Sep. 29, 2010, now Pat. No. 8,077,116, which is a continuation of application No. 11/841,207, filed on Aug. 20, 2007, now Pat. No. 7,830,320.

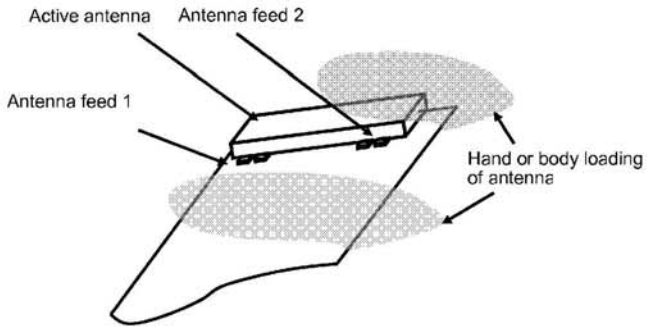
Publication Classification

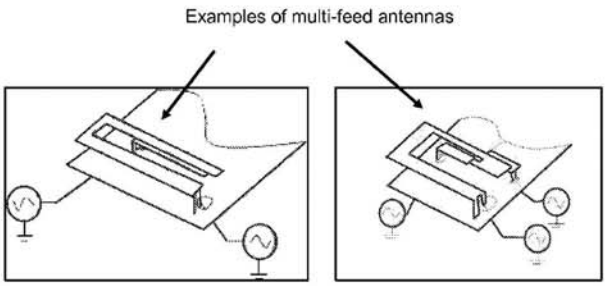
(51) **Int. Cl.**
H01Q 1/50 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 1/50*** (2013.01)
USPC **343/852**

(57) **ABSTRACT**

A self-reconfigurable multimode antenna system where loading conditions of sensors are analyzed and used to generate control signals to dynamically reconfigure an antenna for improved performance. One or multiple sensors can be coupled to the antenna to dynamically change the radiating structure. One or multiple sensors can be coupled to the input or matching section of the antenna to improve or alter the impedance match of the antenna. An algorithm to relate loading effects of sensors to dynamically adjust the antenna is described.





- Hand or body loading of device can be sensed and comparison of antenna performance between feeds can be conducted
- Best antenna feed selected for loading environment

US 20130135173A1

(19) **United States**

(12) **Patent Application Publication**

Ridgeway

(10) **Pub. No.: US 2013/0135173 A1**

(43) **Pub. Date: May 30, 2013**

(54) **MULTIBAND LOOP ANTENNA**

(71) Applicant: **Robert Wayne Ridgeway**, Saratoga Springs, UT (US)

(72) Inventor: **Robert Wayne Ridgeway**, Saratoga Springs, UT (US)

(21) Appl. No.: **13/682,452**

(22) Filed: **Nov. 20, 2012**

Related U.S. Application Data

(60) Provisional application No. 61/565,205, filed on Nov. 30, 2011.

Publication Classification

(51) **Int. Cl.**

H01Q 5/00	(2006.01)
H01P 11/00	(2006.01)
H01Q 7/00	(2006.01)

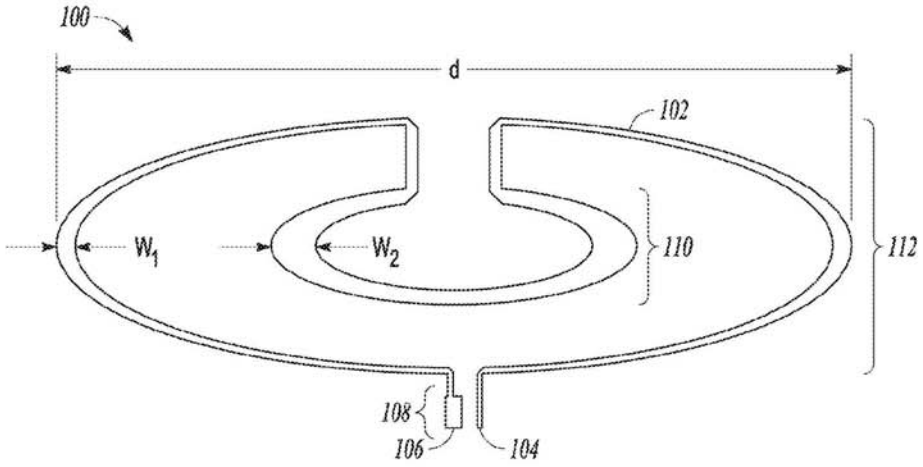
(52) **U.S. Cl.**

CPC ***H01Q 5/0027*** (2013.01); ***H01Q 7/00*** (2013.01); ***H01Q 5/0003*** (2013.01); ***H01Q 5/001*** (2013.01); ***H01P 11/00*** (2013.01)

USPC **343/870**; 343/866; 29/600; 29/601

(57) **ABSTRACT**

An approximately planar antenna assembly can be formed or used, such as comprising a printed circuit board assembly. In an example, the approximately planar antenna assembly can include a dielectric material and a conductive loop comprising an outer loop portion having a first conic section an inner loop portion having a second conic section located within a footprint of the first conic section. The planar antenna assembly can be configured to support wireless transfer of information in at least two ranges of operating frequencies, such as two or more respective ranges used for cellular communications.



US 20130141291A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2013/0141291 A1**

(43) **Pub. Date: Jun. 6, 2013**

Luan

(54) **ANTENNA ARRANGEMENTS FOR COVERING FREQUENCY BANDS**

(76) Inventor: **Yuantao Luan**, Beijing (CN)

(21) Appl. No.: **13/593,748**

(22) Filed: **Aug. 24, 2012**

Related U.S. Application Data

(63) Continuation of application No. PCT/CN2010/070729, filed on Feb. 24, 2010.

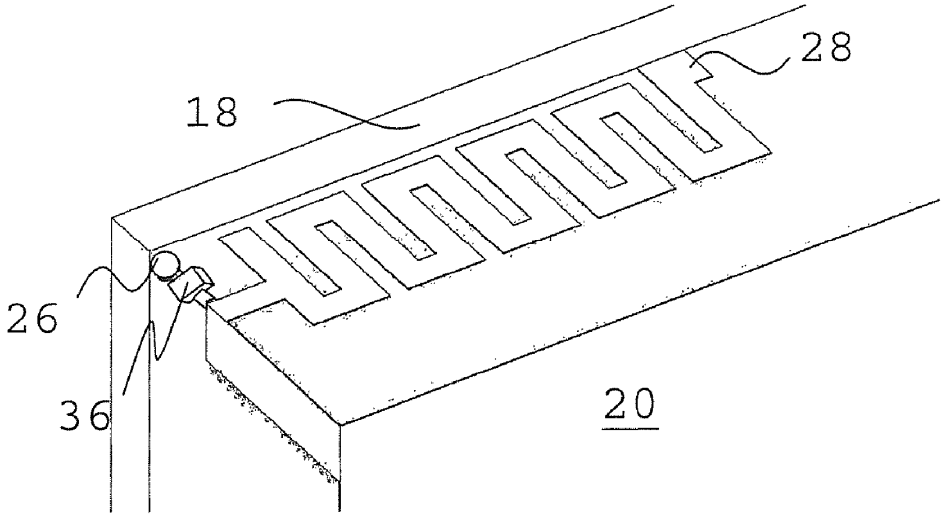
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 5/0062*** (2013.01)
USPC ..... **343/745**; 343/700 MS

(57) **ABSTRACT**

An exemplary embodiment of an antenna arrangement generally includes a board including a ground plane, a radiating element, and a first parasitic element. The radiating element is dimensioned for providing resonance at a first frequency. The radiating element is arranged at a first edge of the board. The first parasitic element is arranged at a second edge of the board opposite the first edge. The first parasitic element is dimensioned for providing resonance at another frequency near the first frequency for providing coverage of a first frequency band. A major extension of the first parasitic element is along the second edge of the board.



US 20130141298A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0141298 A1

(43) Pub. Date: Jun. 6, 2013

Zhang

(54) **PENTA-BAND INTERNAL ANTENNA AND MOBILE COMMUNICATION TERMINAL THEREOF**

(75) Inventor: **Lian Zhang**, Huizhou (CN)

(73) Assignee: **HUIZHOU TCL MOBILE COMMUNICATION CO., LTD**, HUIZHOU, GUANGDONG (CN)

(21) Appl. No.: **13/816,217**

(22) PCT Filed: **Nov. 5, 2011**

(86) PCT No.: **PCT/CN2011/081835**

§ 371 (c)(1),
(2), (4) Date: **Feb. 8, 2013**

(30) **Foreign Application Priority Data**

Dec. 1, 2010 (CN) 201010568427.3

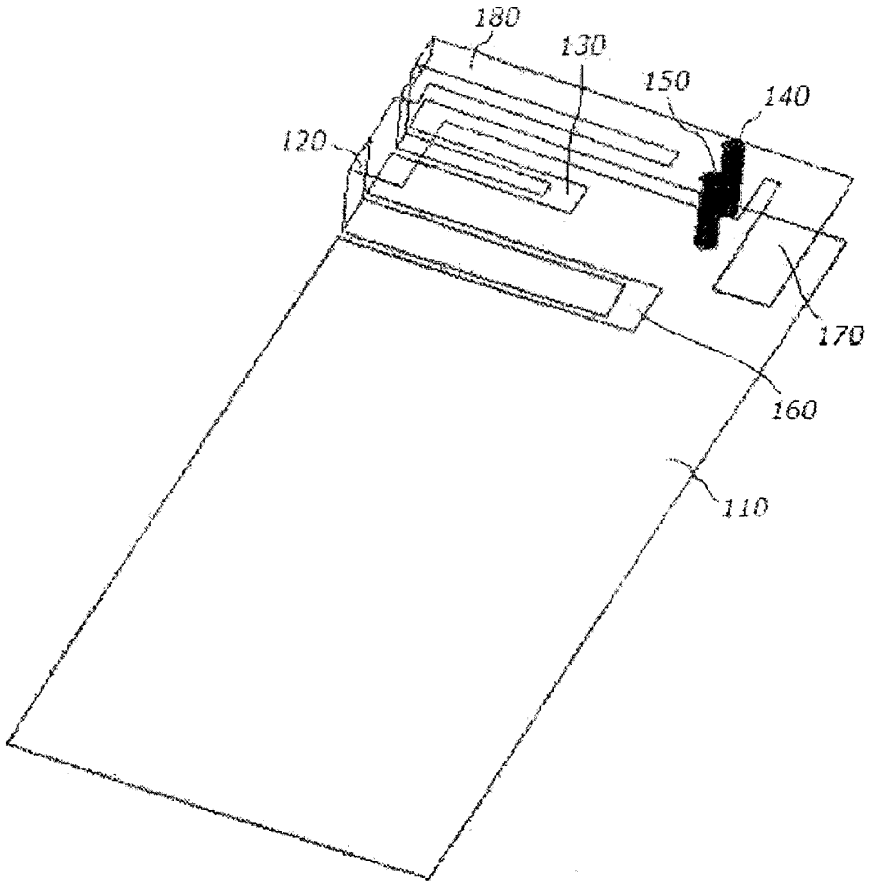
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 9/0414*** (2013.01)
USPC **343/770**

(57) **ABSTRACT**

A penta-band internal antenna and a mobile communication terminal may include: a first high-frequency branch, a second high-frequency branch, and a low-frequency branch of an antenna radiating element, and a first slotted hole and a second slotted hole arranged on a printed circuit board. The first slotted hole may be arranged along a direction substantially perpendicular to the current flow direction of the printed circuit board. The open-circuit end of the low-frequency branch may be fitted into the first slotted hole and the open-circuit end of the second high-frequency branch may be fitted into the second slotted hole.



US 20130141302A1

(19) **United States**

(12) **Patent Application Publication**

ISHIHARA et al.

(10) **Pub. No.: US 2013/0141302 A1**

(43) **Pub. Date: Jun. 6, 2013**

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

(75) Inventors: **Takashi ISHIHARA**, Ishikawa-gun (JP); **Jin SATO**, Beijing (CN); **Yuji KAMINISHI**, Ishikawa-gun (JP); **Shigekazu ITO**, Hakusan-shi (JP)

(73) Assignee: **Murata Manufacturing Co., Ltd.**, Nagaokakyo-shi (JP)

(21) Appl. No.: **13/451,642**

(22) Filed: **Apr. 20, 2012**

Related U.S. Application Data

(63) Continuation of application No. 12/266,099, filed on Nov. 6, 2008, now Pat. No. 8,314,737, which is a continuation of application No. PCT/JP2007/056068, filed on Mar. 23, 2007.

(30) **Foreign Application Priority Data**

May 11, 2006 (JP) 2006-132803

Publication Classification

(51) **Int. Cl.**

H01Q 9/06 (2006.01)

H01Q 1/42 (2006.01)

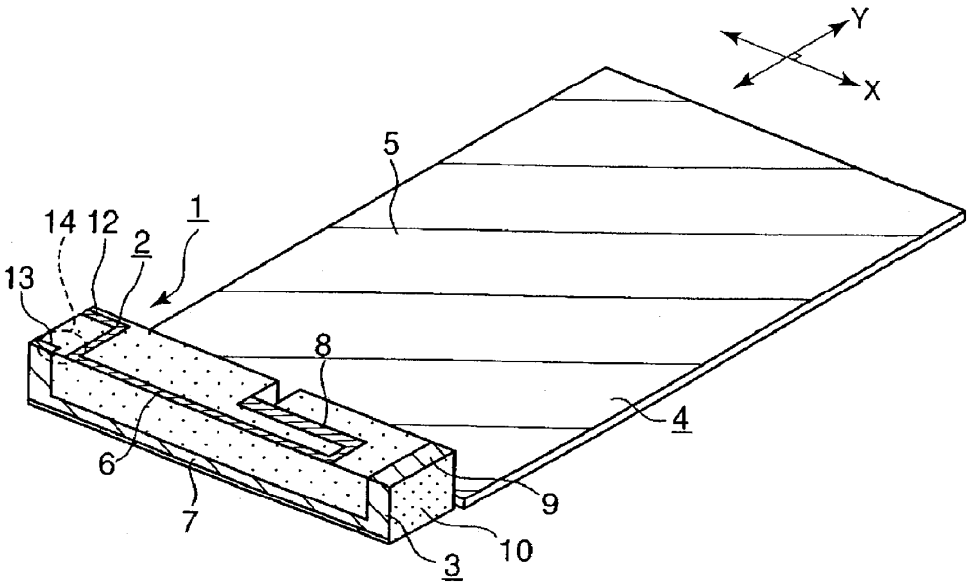
(52) **U.S. Cl.**

CPC ... ***H01Q 9/06*** (2013.01); ***H01Q 1/42*** (2013.01)

USPC ..... **343/872**; 343/700 MS

(57) **ABSTRACT**

A non-feeding element is provided with a proximity-providing gap from a feeding element, and a resonant state is generated there by capacitive coupling. The non-feeding element resonates at a frequency different from a resonant frequency of the feeding element. The feeding element and the non-feeding element have alongside-ground-terminal extending portions spaced from an edge surface at one end of a ground surface formed on the circuit board and to extend in a direction along the edge surface at the one end of the ground surface. The feeding element and/or the non-feeding element is formed three-dimensionally with a plurality of bending portions so that at least parts of the alongside-ground-terminal extending portion of the feeding element and the ground-terminal extending portion of the non-feeding element have substantially the same amount of spacing from the ground surface.



US 20130141304A1

(19) **United States**

(12) **Patent Application Publication**

Chen

(10) **Pub. No.: US 2013/0141304 A1**

(43) **Pub. Date: Jun. 6, 2013**

(54) **THREE-FEED LOW-PROFILE ANTENNA STRUCTURE OFFERING HIGH PORT-TO-PORT ISOLATION AND MULTIBAND OPERATION**

(71) Applicant: **SkyCross, Inc.**, Viera, FL (US)

(72) Inventor: **Li Chen**, Melbourne, FL (US)

(73) Assignee: **SkyCross, Inc.**, Viera, FL (US)

(21) Appl. No.: **13/657,138**

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

Related U.S. Application Data

(60) Provisional application No. 61/549,449, filed on Oct. 20, 2011.

Publication Classification

(51) **Int. Cl.**

H01Q 25/04 (2006.01)

H01Q 21/00 (2006.01)

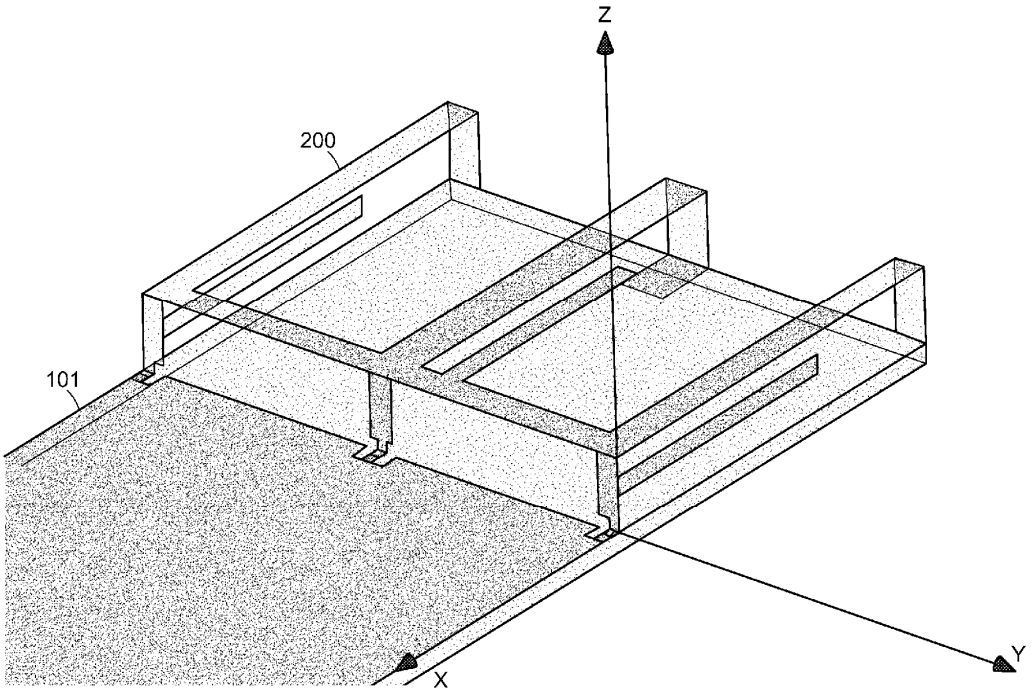
(52) **U.S. Cl.**

CPC ***H01Q 25/04*** (2013.01); ***H01Q 21/0006*** (2013.01)

USPC ..... **343/893**; 343/700 MS

(57) **ABSTRACT**

A three-feed, low-profile antenna offers high port-to-port isolation and multiband operation. Applications for the antenna include, but are not limited to, USB dongle, netbook, notebook, tablet, laptop, and set-top box applications requiring 3-feed MIMO or diversity protocols.



US 20130147669A1

(19) **United States**

(12) **Patent Application Publication**

MAO

(10) **Pub. No.: US 2013/0147669 A1**

(43) **Pub. Date: Jun. 13, 2013**

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

(71) Applicant: **Richwave Technology Corp.**, Taipei (TW)

(72) Inventor: **Shau-Gang MAO**, Taipei (TW)

(73) Assignee: **RICHWAVE TECHNOLOGY CORP.**, Taipei (TW)

(21) Appl. No.: **13/675,369**

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

(30) **Foreign Application Priority Data**

Dec. 9, 2011 (TW) 100145515

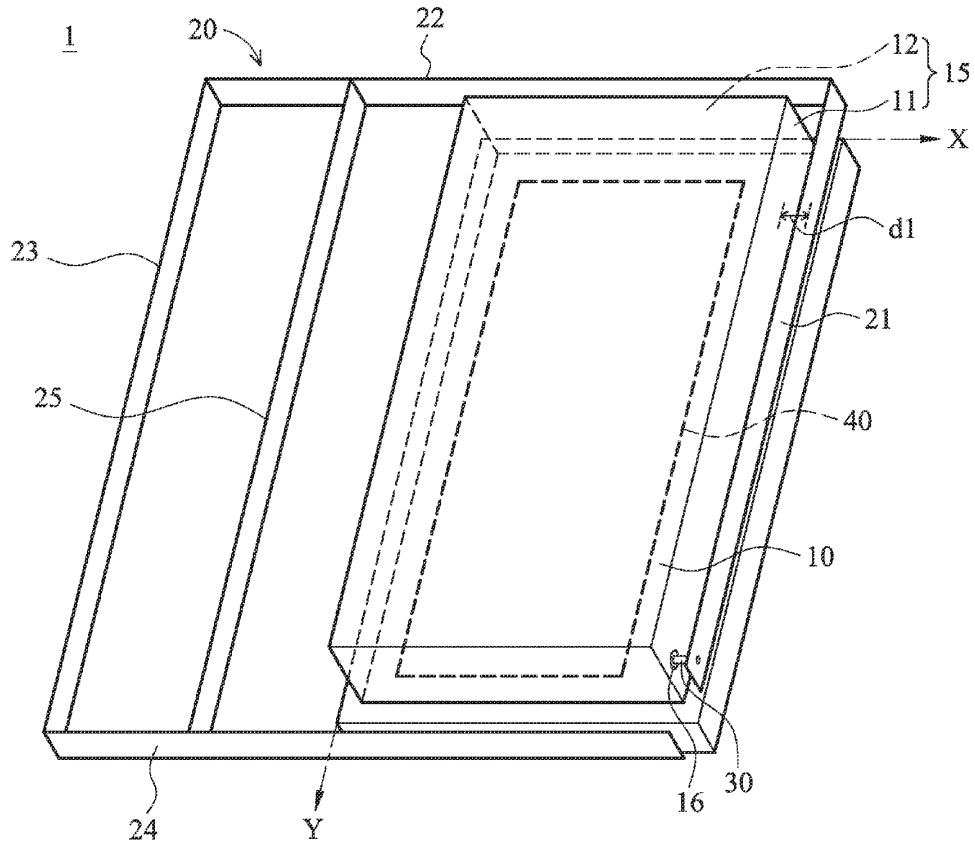
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 1/24*** (2013.01)
USPC **343/702**

(57) **ABSTRACT**

An antenna module in provided. The antenna module includes a metal housing, a radiator and a feed conductor. The metal housing includes a housing surface and a through hole. The radiator surrounds the metal housing. The feed conductor connects the radiator to an inner circuit inside the metal housing via the through hole.



US 20130147672A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0147672 A1

(43) Pub. Date: Jun. 13, 2013

Desclos et al.

(54) **MODAL ANTENNA WITH CORRELATION MANAGEMENT FOR DIVERSITY APPLICATIONS**

(71) Applicant: **ETHERTRONICS, INC.**, San Diego, CA (US)

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

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

(21) Appl. No.: **13/674,137**

(22) Filed: **Nov. 12, 2012**

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/029,564, filed on Feb. 17, 2011, now Pat. No. 8,362,962, which is a continuation of application No. 12/043,090, filed on Mar. 5, 2008, now Pat. No. 7,911,402, Continuation-in-part of application No. 13/227,361, filed on Sep. 7, 2011.

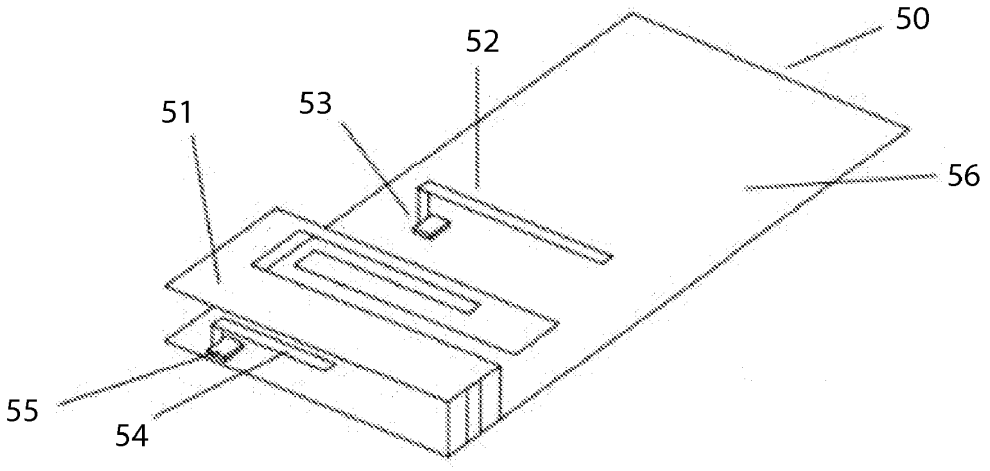
Publication Classification

(51) **Int. Cl.**
H01Q 9/06 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 9/06*** (2013.01)
USPC **343/745**

(57) **ABSTRACT**

Antenna systems comprising modal antennas for use in diversity and similar schemes include a modal antenna capable of multiple antenna modes wherein a distinct radiation pattern exists for each antenna mode, and a control signal for directing variation of the antenna modes. Methods for designing modal diversity antennas are further disclosed.



US 20130147673A1

(19) **United States**

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Lee et al.

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(43) **Pub. Date: Jun. 13, 2013**

(54) **METAMATERIAL LOADED ANTENNA STRUCTURES**

(71) Applicant: **Tyco Electronics Services GMBH**, Schaffhausen (CH)

(72) Inventors: **Cheng Jung Lee**, Santa Clara, CA (US); **Maha Achour**, Encinitas, CA (US); **Ajay Gummalla**, Sunnyvale, CA (US)

(73) Assignee: **Tyco Electronics Services GMBH**, Schaffhausen (CH)

(21) Appl. No.: **13/758,873**

(22) Filed: **Feb. 4, 2013**

Related U.S. Application Data

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(60) Provisional application No. 61/098,735, filed on Sep. 19, 2008.

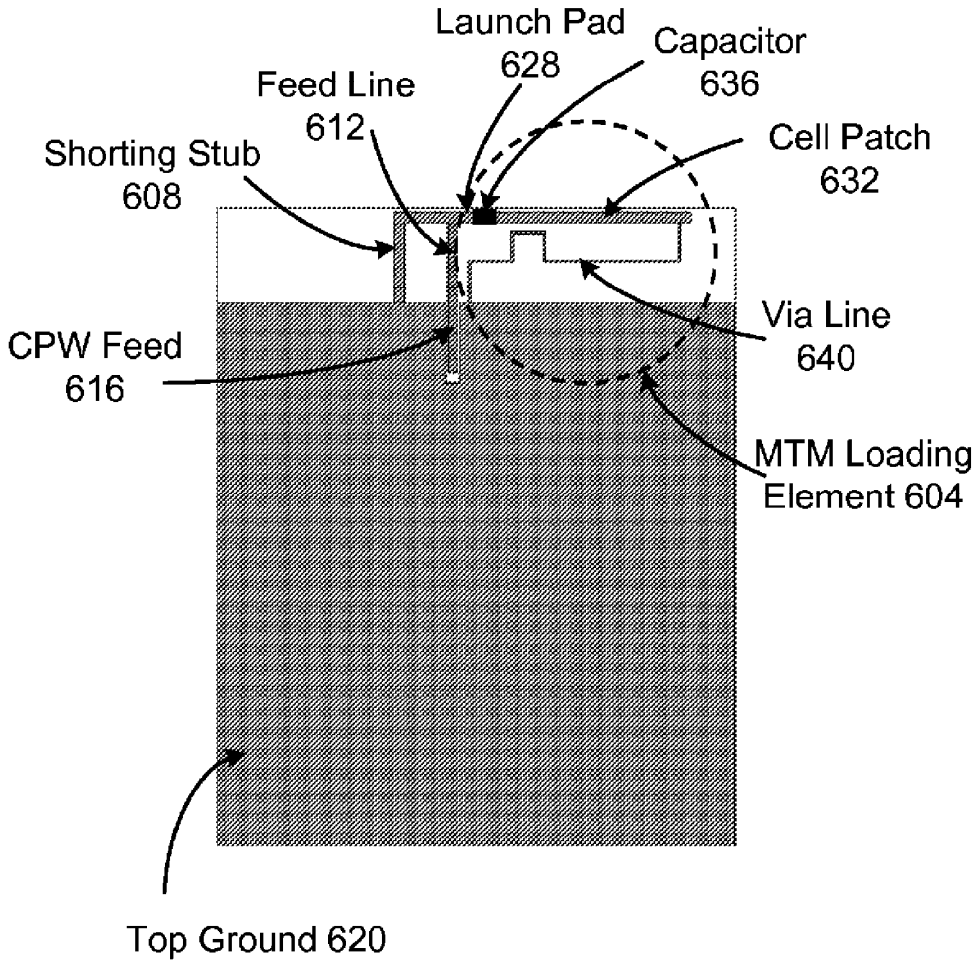
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 1/38*** (2013.01)
USPC **343/749**; 29/600

(57) **ABSTRACT**

Techniques and devices based on antenna structures with a MTM loading element.



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KOMURA

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(43) **Pub. Date: Jun. 13, 2013**

(54) **ANTENNA DEVICE, ANTENNA MODULE, AND PORTABLE TERMINAL**

(71) Applicant: **MURATA MANUFACTURING CO., LTD.**, Kyoto-fu (JP)

(72) Inventor: **Ryo KOMURA**, Kyoto-fu (JP)

(73) Assignee: **MURATA MANUFACTURING CO., LTD.**, Kyoto-fu (JP)

(21) Appl. No.: **13/762,277**

(22) Filed: **Feb. 7, 2013**

Related U.S. Application Data

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(30) **Foreign Application Priority Data**

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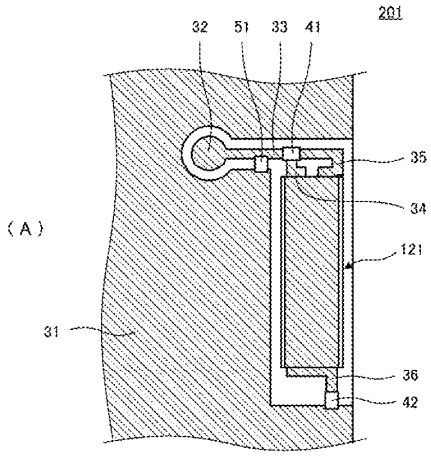
Publication Classification

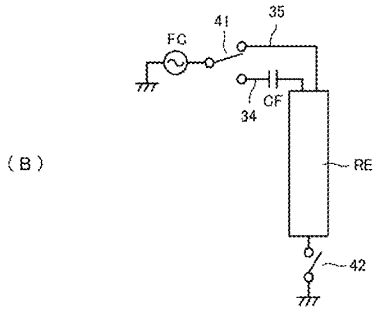
(51) **Int. Cl.**
H01Q 9/04 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 9/045*** (2013.01)
USPC **343/750**

(57) **ABSTRACT**

Radiation electrodes are formed on a dielectric base body of an antenna chip. A capacitive feeding electrode is formed on a first end surface of the dielectric base body. A ground electrode, a feeding circuit connection electrode, feeding lines, a tip electrode, and the like are formed on the top surface of a base member of a substrate. When a first switching element selects the feeding line side, a second switching element is made to enter a conducting state. In this state, the radiation electrodes are capacitively fed. When the first switching element selects the feeding line side, the second switching element is made to enter an open state. In this state, the radiation electrodes are directly fed. In this manner, the directivity direction of an antenna can be switched using a single radiation element.





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(19) **United States**

(12) **Patent Application Publication**

KATO et al.

(10) **Pub. No.: US 2013/0147675 A1**

(43) **Pub. Date: Jun. 13, 2013**

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

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

(72) Inventors: **Noboru KATO**, Nagaokakyo-shi (JP); **Jun SASAKI**, Nagaokakyo-shi (JP); **Satoshi ISHINO**, Nagaokakyo-shi (JP)

(73) Assignee: **Murata Manufacturing Co., Ltd.**, Nagaokakyo-shi (JP)

(21) Appl. No.: **13/761,195**

(22) Filed: **Feb. 7, 2013**

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2011/073054, filed on Oct. 6, 2011.

(30) **Foreign Application Priority Data**

Oct. 12, 2010 (JP) 2010-229756
Dec. 8, 2010 (JP) 2010-273214

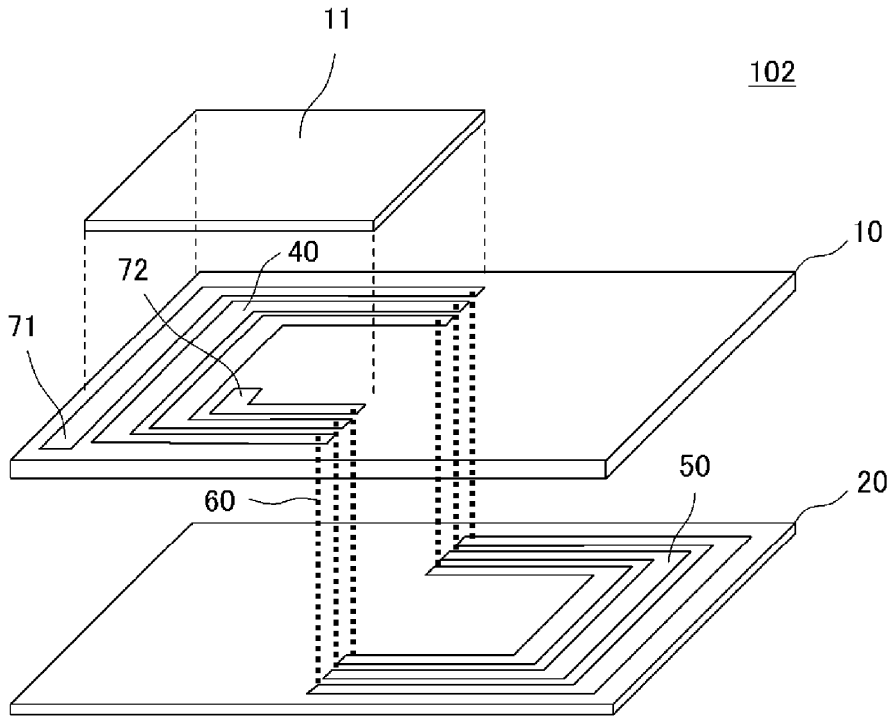
Publication Classification

(51) **Int. Cl.**
H01Q 7/06 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 7/06*** (2013.01)
USPC **343/788**

(57) **ABSTRACT**

An antenna device includes an antenna coil including a first conductive pattern disposed on a first major surface of a magnetic sheet, a second conductive pattern disposed on a first major surface of a non-magnetic sheet, and an interlayer conductor connecting the first conductive pattern and second conductive pattern. The antenna coil including the first conductive pattern and second conductive pattern defines a spiral or substantially spiral pattern. The antenna device is a resin multilayer structure in which its base body is a laminate of the magnetic layer and non-magnetic layer and the predetermined patterns are disposed inside and outside the laminate.



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(19) **United States**

(12) **Patent Application Publication**

CHANG et al.

(10) **Pub. No.: US 2013/0147676 A1**

(43) **Pub. Date: Jun. 13, 2013**

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

(75) Inventors: **SHU-WEI CHANG**, Tu-Cheng (TW); **HSIN-HUNG LIU**, Tu-Cheng (TW); **FU-HSIUNG YANG**, Tu-Cheng (TW)

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

(21) Appl. No.: **13/559,617**

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

(30) **Foreign Application Priority Data**

Dec. 8, 2011 (TW) 100145209

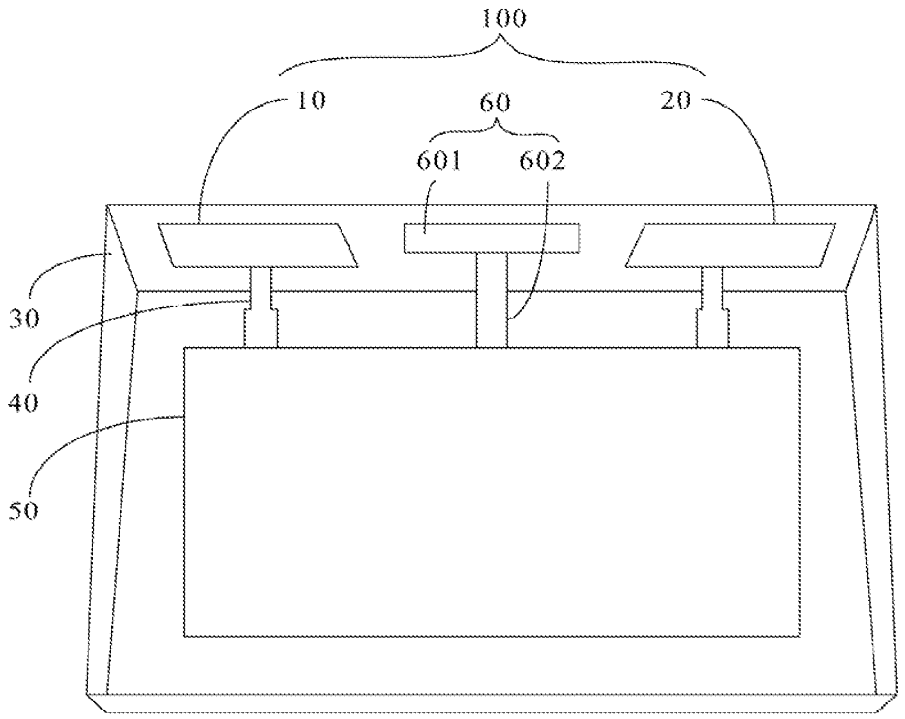
Publication Classification

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

(52) **U.S. Cl.**
USPC **343/841**

(57) **ABSTRACT**

An antenna structure includes a first antenna and a second antenna both connected to a PCB of an electronic device and a grounded metal sheet arranged between the first antenna and the second antenna. The metal sheet forms a capacitor and an inductor, and the capacitor and the inductor form a filtering circuit that is able to reduce interference between the first antenna and the second antenna.



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(19) **United States**

(12) **Patent Application Publication**

JENG

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(43) **Pub. Date: Jun. 13, 2013**

(54) **ANTENNA STRUCTURE OF HANDHELD DEVICE**

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

(73) Assignee: **Acer Incorporated**, Taipei Hsien (TW)

(21) Appl. No.: **13/454,981**

(22) Filed: **Apr. 24, 2012**

(30) **Foreign Application Priority Data**

Dec. 8, 2011 (TW) 100145293

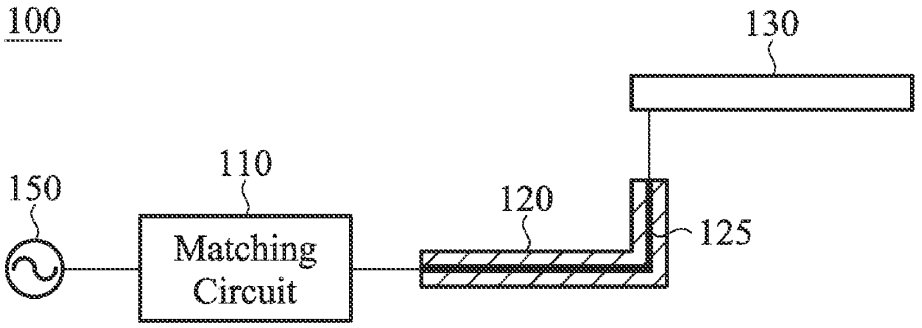
Publication Classification

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

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

(57) **ABSTRACT**

An antenna structure includes a matching circuit, a flexible printed circuit board, and an external metal element. The matching circuit is configured to provide impedance. The flexible printed circuit board has a variable shape, wherein a metal wire is disposed on the flexible printed circuit board. The external metal element is coupled to a signal source through the metal wire disposed on the flexible printed circuit board and the matching circuit.



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(19) **United States**

(12) **Patent Application Publication**

SU et al.

(10) **Pub. No.: US 2013/0147680 A1**

(43) **Pub. Date: Jun. 13, 2013**

(54) **ANTENNA IMPEDANCE MATCHING METHOD**

(75) Inventors: **JIA-HUNG SU**, New Taipei (TW); **YI-FENG HUANG**, New Taipei (TW); **KAI SHIH**, New Taipei (TW)

(73) Assignee: **Cheng Uei Precision Industry Co., LTD.**, New Taipei City (TW)

(21) Appl. No.: **13/325,053**

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

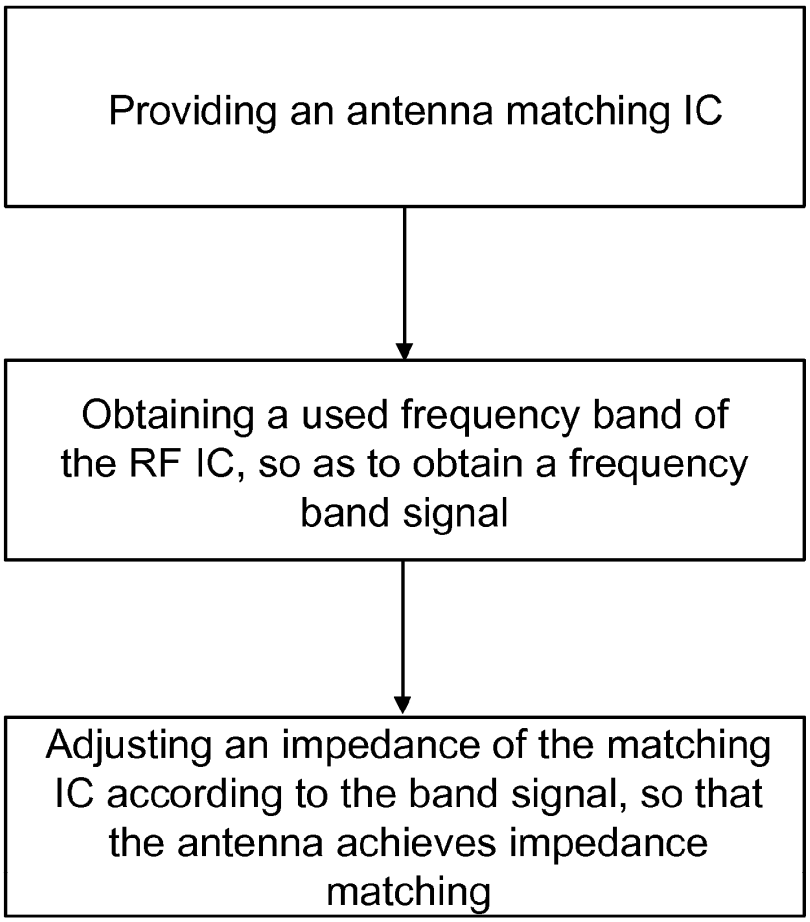
Publication Classification

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

(52) **U.S. Cl.**
USPC **343/861**

(57) **ABSTRACT**

The present invention discloses an antenna impedance matching method which is used for adjusting an impedance of an antenna to match an impedance of a radio frequency (RF) integrated circuit (IC). The method comprises the following steps of: (1) providing an antenna matching IC; (2) obtaining a used frequency band of the RF IC, so as to obtain a frequency band signal; (3) adjusting an impedance of the matching IC according to the band signal, so that the antenna achieves impedance matching. In summary, the present invention uses the matching IC to instead of a traditional matching circuit, and according to the band signal of the RF IC to adjust and match the impedance of the IC, so as to change the resonance and impedance of the antenna, and to achieve the impedance matching.



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(19) **United States**

(12) **Patent Application Publication**

Lum et al.

(10) **Pub. No.: US 2013/0148636 A1**

(43) **Pub. Date: Jun. 13, 2013**

(54) **WIRELESS ELECTRONIC DEVICE WITH ANTENNA SWITCHING CIRCUITRY**

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

(72) Inventors: **Nicholas W. Lum**, Santa Clara, CA (US); **Ronald W. Dimpflmaier**, Los Gatos, CA (US)

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

(21) Appl. No.: **13/631,483**

(22) Filed: **Sep. 28, 2012**

Related U.S. Application Data

(60) Provisional application No. 61/569,641, filed on Dec. 12, 2011.

Publication Classification

(51) **Int. Cl.**

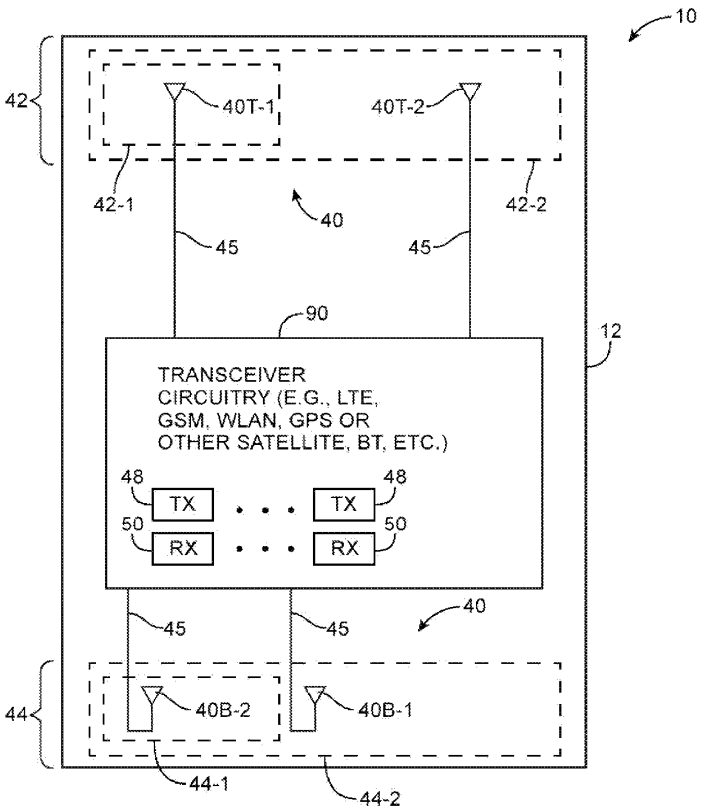
H04W 88/06	(2009.01)
H04J 3/00	(2006.01)
H04W 4/00	(2009.01)

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

USPC **370/336**; 455/426.1; 455/553.1

(57) **ABSTRACT**

A wireless electronic device may include antennas formed at different locations on the device. The wireless electronic device may include transceivers that are used to wirelessly communicate in different frequency bands by transmitting and receiving radio-frequency signals in the frequency bands. The transceivers may include Wi-Fi® transceivers and cellular transceivers such as Long Term Evolution transceivers. The wireless electronic device may include antenna switching circuitry interposed between the transceivers and the antennas. The wireless electronic device may include control circuitry that controls the antenna switching circuitry to ensure that radio-frequency transmissions in adjacent frequency bands are routed to different antennas. By routing radio-frequency transmissions in adjacent frequency bands to different antennas, self-interference between communications in the adjacent frequency bands may be reduced. Self-interference may also be reduced by performing time division multiplexing to isolate radio-frequency signals that are transmitted in adjacent frequency bands.



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(19) **United States**

(12) **Patent Application Publication**

Tseng et al.

(10) **Pub. No.: US 2013/0150125 A1**

(43) **Pub. Date: Jun. 13, 2013**

(54) **ELECTRONIC SYSTEM AND ELECTRONIC DEVICE HAVING THE SAME**

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

(72) Inventors: **Chang-Yi Tseng**, Taipei (TW); **Chung-Yuan Kuang**, Taipei (TW)

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

(21) Appl. No.: **13/693,325**

(22) Filed: **Dec. 4, 2012**

(30) **Foreign Application Priority Data**

Dec. 8, 2011 (TW) 100145397

Publication Classification

(51) **Int. Cl.**
H04W 88/02 (2006.01)

(52) **U.S. Cl.**
CPC ***H04W 88/02*** (2013.01)
USPC **455/557**

(57) **ABSTRACT**

An electronic system and a second electronic device having the same include a first electronic device and a second electronic device. The first electronic device includes a first antenna, a control module, a connecting port and a switch module. The second electronic device includes a second antenna, a corresponding connecting port and a second antenna. When the connecting port of the first electronic device is connected to the corresponding connecting port of the second electronic device, the first electronic device switches from the first antenna to the second antenna of the second electronic device via the switch module, and the first electronic device can carry out wireless communication via the second antenna of the second electronic device.