US 20100134358A1

(19) **United States**

(12) **Patent Application Publication**

Su et al.

(10) **Pub. No.: US 2010/0134358 A1**

(43) **Pub. Date: Jun. 3, 2010**

(54) **MULTI-BAND ANTENNA**

(75) Inventors: **Jia-Hung Su**, Taipei Hsien (TW); **Yung-Chih Tsai**, Taipei Hsien (TW); **Kai Shih**, Taipei Hsien (TW); **Yu-Yuan Wu**, Taipei Hsien (TW)

Correspondence Address:
WPAT, PC
INTELLECTUAL PROPERTY ATTORNEYS
2030 MAIN STREET, SUITE 1300
IRVINE, CA 92614 (US)

(73) Assignee: **Cheng Uei Precision Industry Co., Ltd**, Taipei Hsien (TW)

(21) Appl. No.: **12/325,658**

(22) Filed: **Dec. 1, 2008**

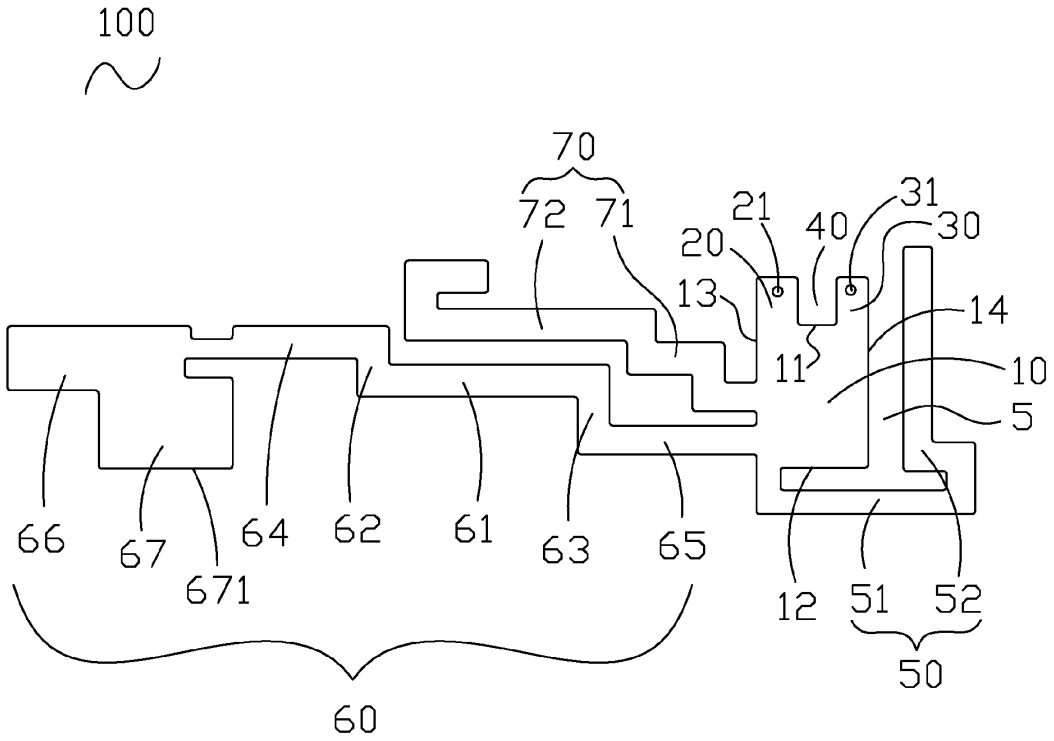
Publication Classification

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

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

(57) **ABSTRACT**

A multi-band antenna includes a base plate, a first radiating element, a second radiating element and a third radiating element. The base plate has a first edge, a second edge opposite to the first edge, a third edge and a fourth edge both connecting the first and second edges and opposite to each other. A feeding portion and a ground portion are both extended from the first edge and respectively adjacent to the third edge and the fourth edge, and an opening is formed between the feeding portion and the ground portion. The first radiating element extends from a portion of the second edge adjacent to the third edge and spatially fences the second edge and the fourth edge. The second and third radiating elements tortuously extend from the third edge and are arranged adjacent to each other.



US 20100134360A1

(19) **United States**

(12) **Patent Application Publication**

Ryou et al.

(10) **Pub. No.: US 2010/0134360 A1**

(43) **Pub. Date: Jun. 3, 2010**

(54) **INTEGRATED ANTENNA OF PARALLEL-RING TYPE**

(76) Inventors: **Byung Hoon Ryou**, Seoul (KR); **Won Mo Sung**, Gyeonggi-do (KR); **Jae Young Lee**, Seoul (KR)

Correspondence Address:
BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040 (US)

(21) Appl. No.: **12/522,913**

(22) PCT Filed: **Jan. 10, 2008**

(86) PCT No.: **PCT/KR2008/000164**

§ 371 (c)(1),
(2), (4) Date: **Jan. 12, 2010**

(30) **Foreign Application Priority Data**

Jan. 11, 2007 (KR) 10-2007-0003272

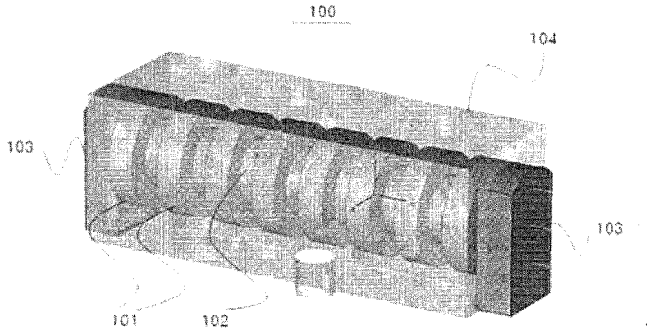
Publication Classification

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

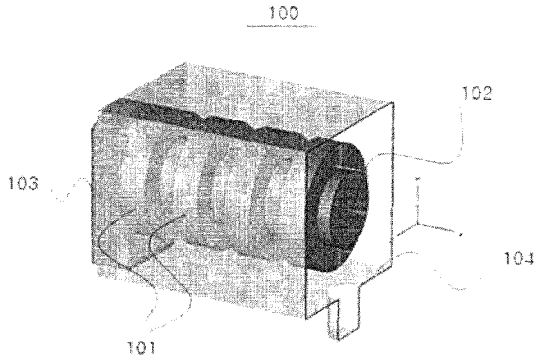
(52) **U.S. Cl.** ..... **343/702**; 343/700 MS

(57) **ABSTRACT**

The present invention relates to a parallel-ring integrated antenna. The integrated antenna in accordance with the present invention includes a parallel ring including a plurality of rings and a central conductor, and a high dielectric body coupled to the parallel ring. Return loss can be changed depending on a thickness of the ring, a first diameter, i.e., a diameter of the ring, a distance between the rings or a second diameter, i.e., a diameter of a central conductor. Further, the high dielectric body has a groove formed therein to correspond to an external shape of the parallel ring. The parallel ring is coupled to the high dielectric body through the groove. Thus, the integrated antenna of the present invention can obtain a maximum gain and active performance while maintaining the size of an existing chip antenna and can have its size and structure changed easily and conveniently by combining the high dielectric body with the parallel ring.



(a)



(b)

US 20100134362A1

(19) **United States**

(12) **Patent Application Publication**

Takasu

(10) **Pub. No.: US 2010/0134362 A1**

(43) **Pub. Date: Jun. 3, 2010**

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

(76) Inventor: **Nobuaki Takasu**, Akishima-shi (JP)

Correspondence Address:
BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040 (US)

(21) Appl. No.: **12/576,817**

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

(30) **Foreign Application Priority Data**

Nov. 28, 2008 (JP) 2008-305125

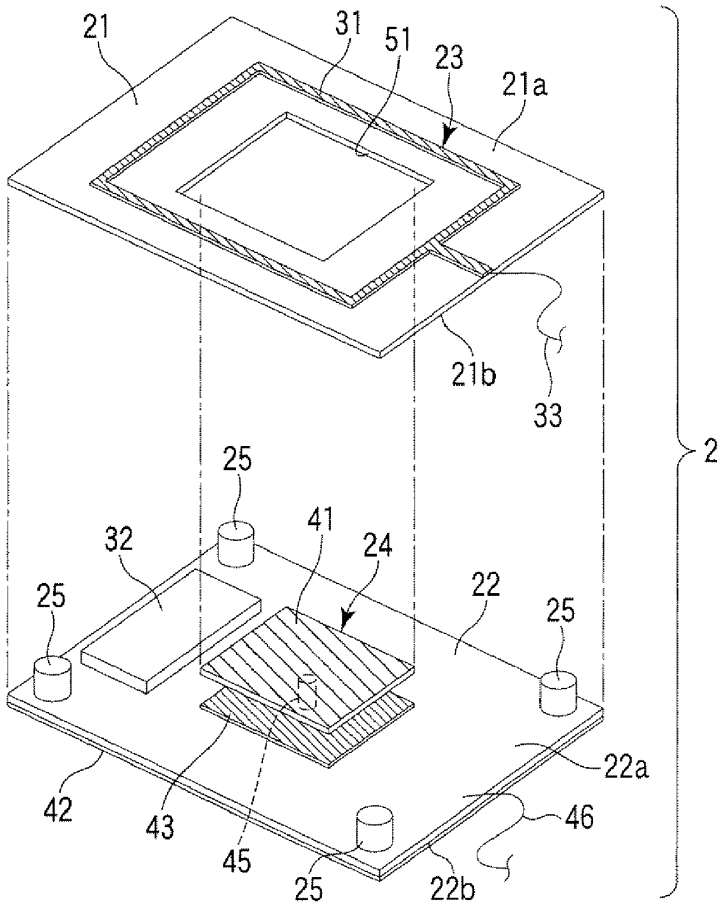
Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 7/00 (2006.01)
H01Q 21/00 (2006.01)

(52) **U.S. Cl.** **343/702**; 343/866; 343/893

(57) **ABSTRACT**

According to one embodiment, an electronic apparatus includes a housing, a first board contained in the housing, a second board contained in the housing on the inner side of the first board, a first antenna part, and a second antenna part. The first antenna part includes a loop antenna provided on the first board, and configured to communicate with a communication module opposed to the loop antenna. The second antenna part includes an element part provided in an area surrounded by the loop antenna, and positioned in the same plane as the loop antenna, and a ground part provided on the second board, and configured to communicate with a communication module opposed to the element part.



US 20100134366A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2010/0134366 A1**

(43) **Pub. Date: Jun. 3, 2010**

Yu

(54) **BROADBAND MULTI-LOOP ANTENNA FOR MOBILE COMMUNICATION DEVICE**

(75) Inventor: **Wei Yu**, Guangdong (CN)

Correspondence Address:
SAM CHEN
7F-1, 293, ROOSEVELT ROAD, SEC 3
TAIPEI (TW)

(73) Assignee: **SHENZHEN SUNWAY COMMICATION CO., LTD.BUILDING 9, CHANGXING HIGH-TECH INDUSTRIAL PARK**, SHENZHEN GUANGDONG (CN)

(21) Appl. No.: **11/721,336**

(22) PCT Filed: **Feb. 5, 2005**

(86) PCT No.: **PCT/CN05/00163**

§ 371 (c)(1),
(2), (4) Date: **Apr. 28, 2009**

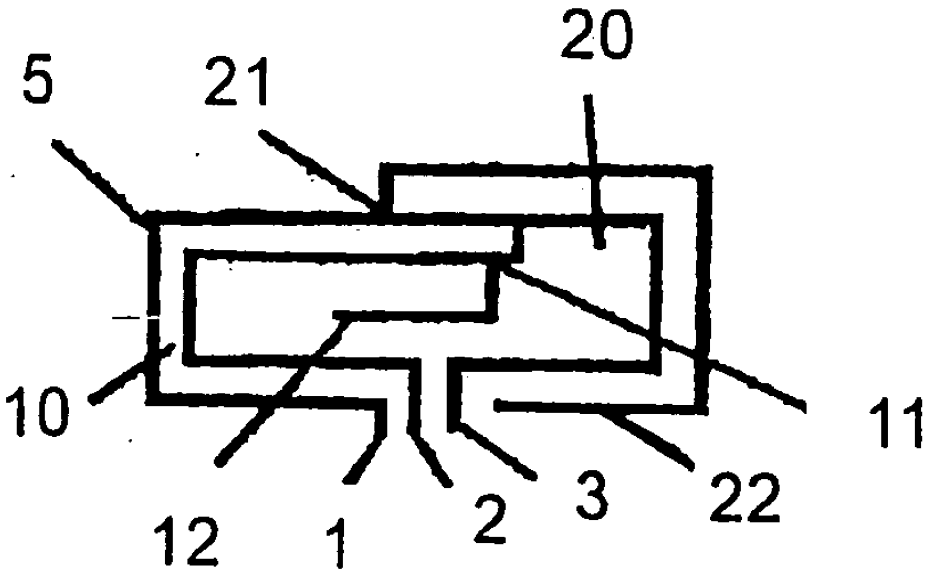
Publication Classification

(51) **Int. Cl.**
H01Q 11/12 (2006.01)
H01Q 5/01 (2006.01)

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

(57) **ABSTRACT**

A broadband multi-signal loop antenna used in a mobile terminal comprises a conductive part and a supporter supporting the conductive part. The said conductive part is electrically connected to the substrate of the mobile terminal. The said conductive part includes at least two signal loops which start at a common feed point and end at the ground points, wherein at least two signal loops each has a ground point and the ground points are located at different physical positions. The antenna can resonate at multi-band.



US 20100134372A1

(19) **United States**

(12) **Patent Application Publication**

Ryu et al.

(10) **Pub. No.: US 2010/0134372 A1**

(43) **Pub. Date: Jun. 3, 2010**

(54) **THZ-BAND FOLDED DIPOLE ANTENNA HAVING HIGH INPUT IMPEDANCE**

(75) Inventors: **Han Cheol Ryu**, Gyeonggi-do (KR); **Kwang Yong Kang**, Daejeon (KR); **Min Hwan Kwak**, Daejeon (KR); **Sung Il Kim**, Seoul (KR)

Correspondence Address:
RABIN & Berdo, PC
1101 14TH STREET, NW, SUITE 500
WASHINGTON, DC 20005 (US)

(73) Assignee: **ELECTRONICS AND TELECOMMUNICATIONS RESEARCH INSTITUTE**, Daejeon (KR)

(21) Appl. No.: **12/498,870**

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

(30) **Foreign Application Priority Data**

Dec. 3, 2008 (KR) 2008-0121920
Mar. 19, 2009 (KR) 2009-0023440

Publication Classification

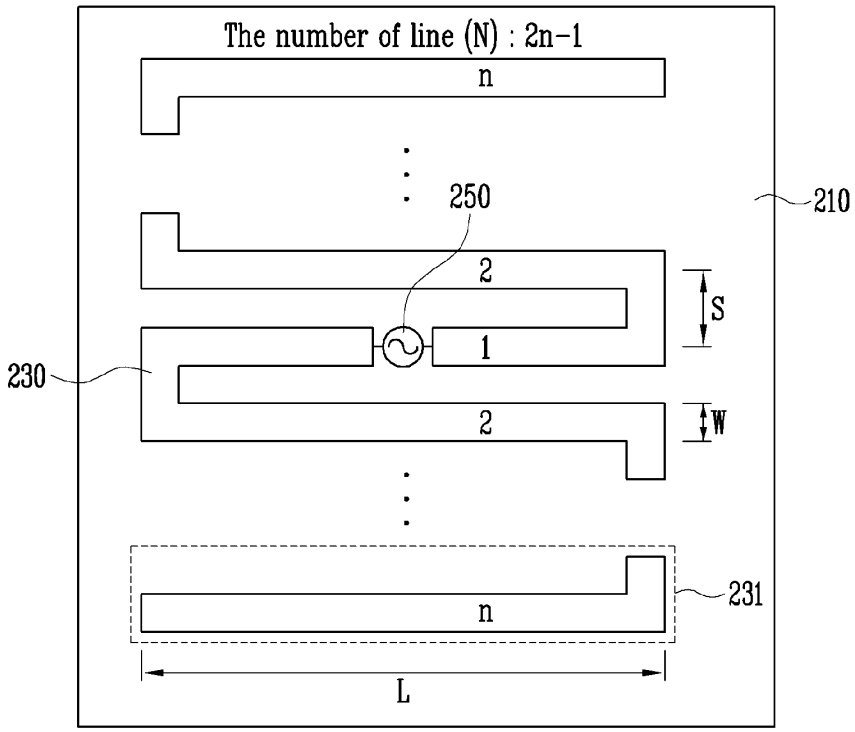
(51) **Int. Cl.**
H01Q 9/16 (2006.01)

(52) **U.S. Cl.** **343/793**; 343/795

(57) **ABSTRACT**

Provided is a folded dipole antenna including a meander line formed on a photoconductive substrate, characterized by an input impedance of several kΩ, which is much higher than that of a conventional dipole antenna, due to optimization of a horizontal length, a line interval, a width, and a line number of the meander line. Accordingly, use of the folded dipole antenna greatly improves an impedance matching characteristic between the antenna and a photomixer having an output impedance of 10 kΩ or more, and accordingly an output of a THz continuous wave.

200



US 20100134375A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2010/0134375 A1

(43) Pub. Date: Jun. 3, 2010

CHEN et al.

(54) PLANAR ANTENNA

(75) Inventors: **Yi-Ting CHEN**, Taipei (TW); **Yi-Fang Lin**, Taipei (TW); **Yang-Kai Wang**, Taipei (TW); **Ya-Ping Chen**, Taipei (TW); **Chia-Ling Liu**, Taipei (TW); **Hsin-Hong Wu**, Taipei (TW)

Correspondence Address:
LADAS & PARRY
5670 WILSHIRE BOULEVARD, SUITE 2100
LOS ANGELES, CA 90036-5679 (US)

(73) Assignee: **ADVANCED CONNECTION TECHNOLOGY INC.**, Taipei (TW)

(21) Appl. No.: **12/327,698**

(22) Filed: **Dec. 3, 2008**

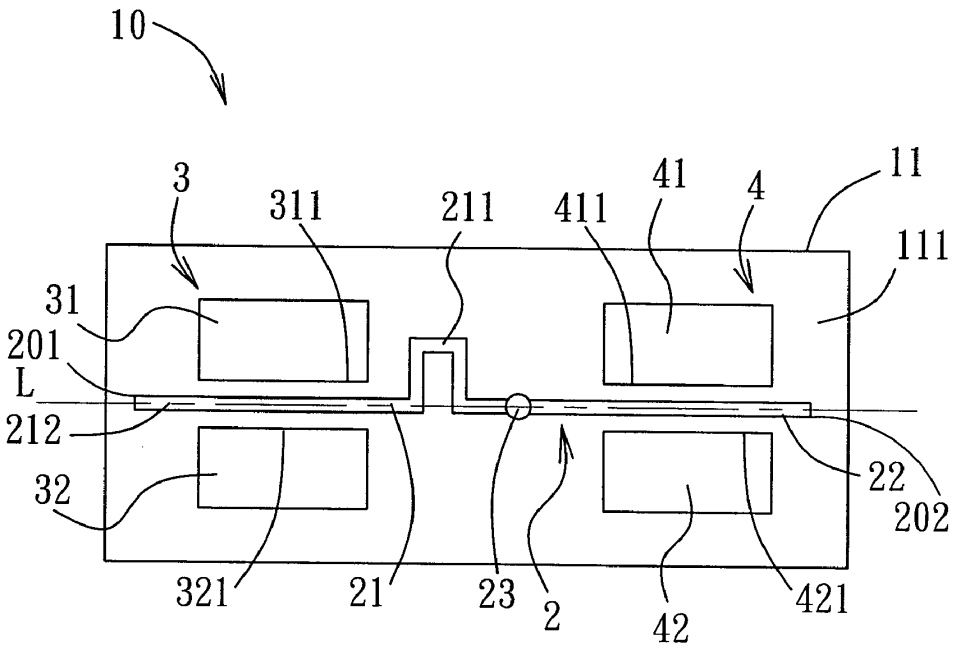
Publication Classification

(51) **Int. Cl.**
H01Q 21/08 (2006.01)

(52) **U.S. Cl.** **343/824**

(57) **ABSTRACT**

A planar antenna includes: a substrate unit; a feeding line provided on the substrate unit and having first and second ends, a feeding point disposed between the first and second ends, and first and second feeding segments extending from the feeding point in opposite directions to the first and second ends, respectively, the lengths of the first and second feeding segments having a length difference that is approximately λ/2, where λ is the wavelength of an operating frequency of the planar antenna; a first radiating unit provided on the substrate unit and disposed adjacent to and spaced apart from the first feeding segment of the feeding line; a second radiating unit provided on the substrate unit and disposed adjacent to and spaced apart from the second feeding segment of the feeding line; and a grounding unit provided on the substrate unit for grounding.



US 20100134377A1

(19) **United States**

(12) **Patent Application Publication**

Tsai et al.

(10) **Pub. No.: US 2010/0134377 A1**

(43) **Pub. Date: Jun. 3, 2010**

(54) **PLANAR ANTENNA**

(75) Inventors: **Hsiao-Ming Tsai**, Taipei (TW); **Ten-Long Dan**, Taipei (TW)

Correspondence Address:
JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100, ROOSEVELT ROAD, SECTION 2
TAIPEI 100 (TW)

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

(21) Appl. No.: **12/399,038**

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

(30) **Foreign Application Priority Data**

Nov. 28, 2008 (TW) 97146340

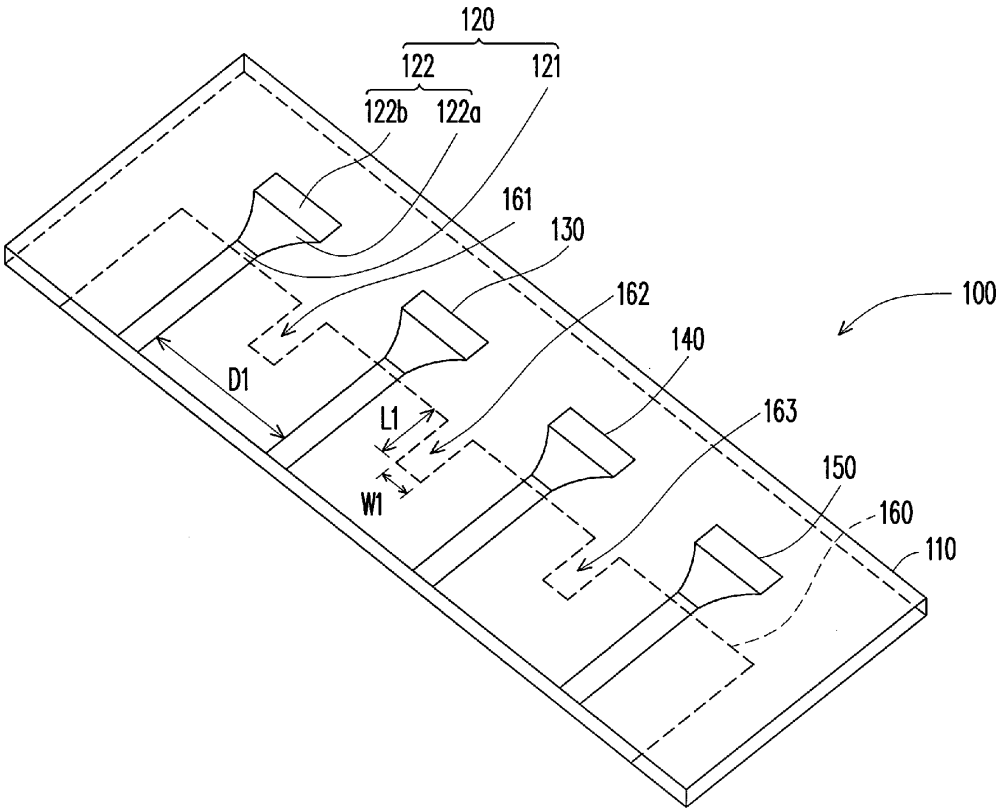
Publication Classification

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

(52) **U.S. Cl.** **343/852**; 343/893

(57) **ABSTRACT**

A planar antenna including a substrate, multiple antenna bodies and a metal layer is provided. The antenna bodies are disposed at a surface of the substrate, and the metal layer is disposed at another surface of the substrate. The metal layer has multiple slots which interlace with the antenna bodies. The antenna bodies are partially corresponding to the metal layer and used to cooperate with a communication system which can perform a multi-path transmission to send and receive electromagnetic signals for a multiple MIMO system simultaneously.



US 20100134382A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2010/0134382 A1

(43) Pub. Date: Jun. 3, 2010

Liu et al.

(54) MULTI-FREQUENCY ANTENNA

(75) Inventors: **Shih-Chia Liu**, Taipei County (TW); **Tien-Chi Lee**, Taipei County (TW); **Tsung-Wen Chiu**, Taipei County (TW); **Fu-Ren Hsiao**, Taipei County (TW)

Correspondence Address:
SCHMEISER OLSEN & WATTS
18 E UNIVERSITY DRIVE, SUITE # 101
MESA, AZ 85201

(73) Assignee: **Advanced Connectek Inc.**, Taipei County (TW)

(21) Appl. No.: **12/351,407**

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

(30) **Foreign Application Priority Data**

Nov. 28, 2008 (TW) 097146169

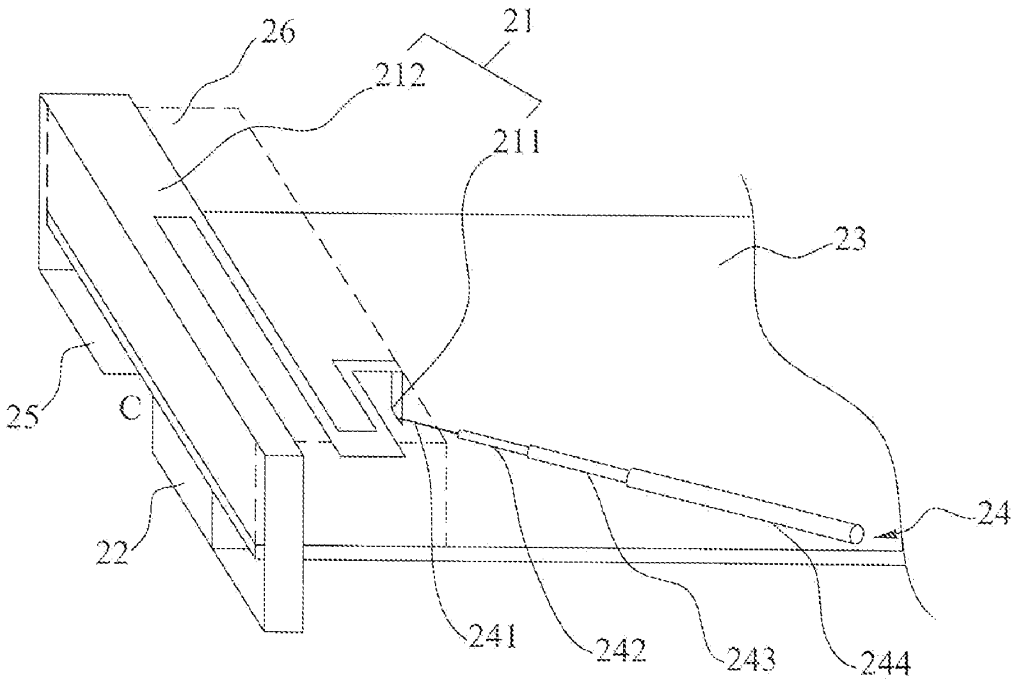
Publication Classification

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

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

(57) **ABSTRACT**

A multi-frequency antenna comprises a radiation conductor, a connection interface device, a ground plane, a feeder cable, and an extension conductor. The radiation conductor further comprises a feeder member and a connection member extending serpentinely and far away from the feeder member and having a terminal. One lateral side of the connection interface device is connected to the terminal of the connection member. Another lateral side of the connection interface device is arranged on the ground plane and electrically connected to the ground plane. The present invention adopts a loop-antenna design. In the present invention, a radiation conductor is used to excite a low-frequency resonant mode and a first high-frequency resonant mode, and an extension conductor is used to excite a second high-frequency resonant mode, whereby the antenna system covers several operation frequency bands and features broadband.



US 20100136924A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2010/0136924 A1

(43) Pub. Date: Jun. 3, 2010

ITO et al.

(54) ANTENNA DEVICE AND WIRELESS COMMUNICATION SYSTEM

(76) Inventors: **Takayoshi ITO**, Kanagawa-ken (JP); **Hiroki Shoki**, Tokyo (JP); **Shuichi Obayashi**, Kanagawa-ken (JP)

Correspondence Address:
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413 (US)

(21) Appl. No.: **12/628,747**

(22) Filed: **Dec. 1, 2009**

(30) **Foreign Application Priority Data**

Dec. 2, 2008 (JP) 2008-307542

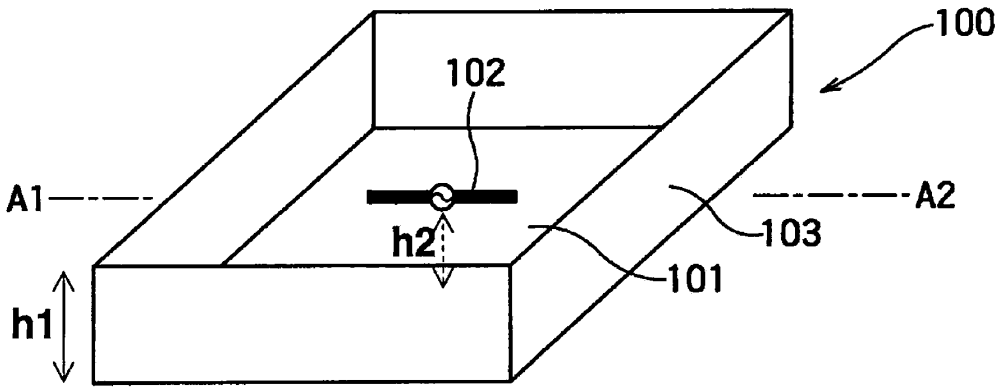
Publication Classification

(51) **Int. Cl.**
H04B 1/38 (2006.01)
H01Q 9/04 (2006.01)

(52) **U.S. Cl.** ..... **455/73**; 343/700 MS

(57) **ABSTRACT**

An antenna device includes a ground plane, an antenna element, and a metal wall. The antenna element is having a distance of (m×λ/2-λ/4) away from the ground plane, where "m" is an integer which is equal or larger than "1" and "λ" is a wave length of operating frequency. The metal wall is surrounding the antenna element. One end of the metal wall is attached to along the ground plane. The other end of the metal wall is forming an aperture with a height from the ground plane. The height of the metal wall is (n×λ/2), where "n" is an integer which is equal or larger than "m".



US 20100137042A1

(19) **United States**

(12) **Patent Application Publication**

NA et al.

(10) **Pub. No.: US 2010/0137042 A1**

(43) **Pub. Date: Jun. 3, 2010**

(54) **MOBILE TERMINAL**

(76) Inventors: **Young Soo NA**, Seoul (KR); **Chang Il Kim**, Seoul (KR)

Correspondence Address:
BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747 (US)

(21) Appl. No.: **12/409,206**

(22) Filed: **Mar. 23, 2009**

(30) **Foreign Application Priority Data**

Nov. 28, 2008 (KR) 10-2008-0119542

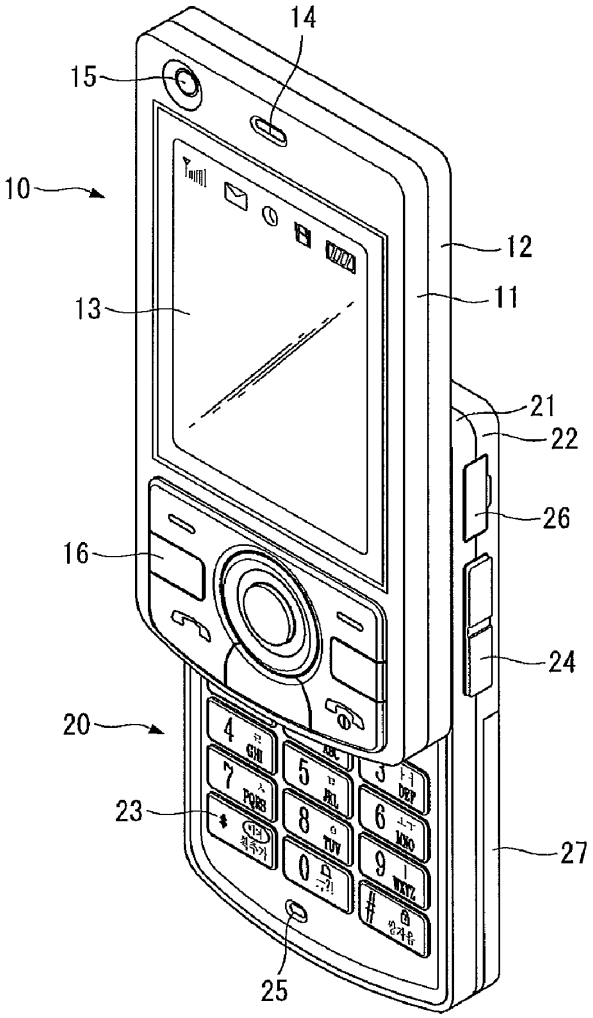
Publication Classification

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

(52) **U.S. Cl.** **455/575.5**; 455/575.7; 455/437

(57) **ABSTRACT**

A mobile terminal comprises a front case and a rear case which are fastened with a printed circuit board (PCB) and an antenna connected with the PCB interposed therebetween; a battery protection cover opening and closing a battery receiving space provided on the rear case; and a conductive coupling element formed on one of the rear case and the battery protection cover such that the conductive coupling element is overlapped with at least one of one edge and the other edge of the antenna



US 20100137043A1

(19) **United States**

(12) **Patent Application Publication**

Horimoto et al.

(10) **Pub. No.: US 2010/0137043 A1**

(43) **Pub. Date: Jun. 3, 2010**

(54) **PORTABLE TERMINAL DEVICE**

(75) Inventors: **Hiroki Horimoto**, Tokyo (JP); **Ryo Tsuchiya**, Tokyo (JP); **Ryota Matsumoto**, Tokyo (JP); **Nobuhiro Oguma**, Saitama (JP)

Correspondence Address:
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P.
1940 DUKE STREET
ALEXANDRIA, VA 22314 (US)

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

(21) Appl. No.: **12/614,055**

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

(30) **Foreign Application Priority Data**

Dec. 3, 2008 (JP) 2008-308971

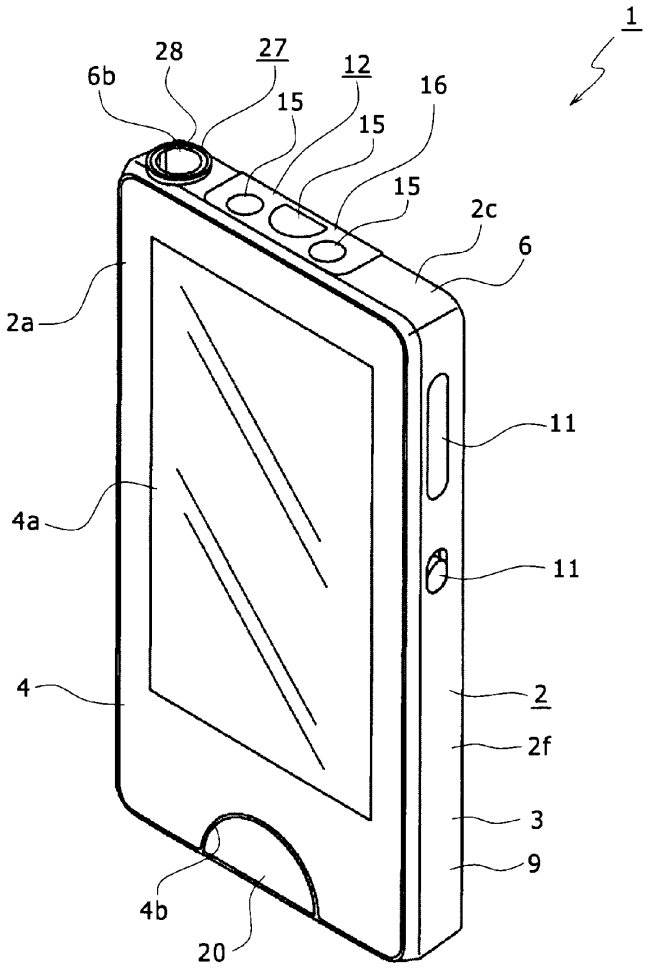
Publication Classification

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

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

(57) **ABSTRACT**

Disclosed herein is a portable terminal device including an antenna, a casing, and an operation unit. The casing at least part of which is formed from a metallic material is disposed so that the antenna is exposed. The operation unit is formed from a resin material and mounted to the casing so as to cover the exposed antenna.



US 20100141536A1

(19) **United States**

(12) **Patent Application Publication**

Zhang et al.

(10) **Pub. No.: US 2010/0141536 A1**

(43) **Pub. Date: Jun. 10, 2010**

(54) **ANTENNA**

(75) Inventors: **Lixia Zhang**, Beijing (CN); **Xiaojuan Guo**, Beijing (CN)

Correspondence Address:
HARNESS, DICKEY, & PIERCE, P.L.C
7700 Bonhomme, Suite 400
ST. LOUIS, MO 63105 (US)

(73) Assignee: **Laird Technologies (Shenzhen), Ltd.**, Shenzhen (CN)

(21) Appl. No.: **12/600,560**

(22) PCT Filed: **May 16, 2008**

(86) PCT No.: **PCT/CN08/70992**

§ 371 (c)(1),
(2), (4) Date: **Nov. 17, 2009**

(30) **Foreign Application Priority Data**

May 18, 2007 (CN) 200710106355.9

Publication Classification

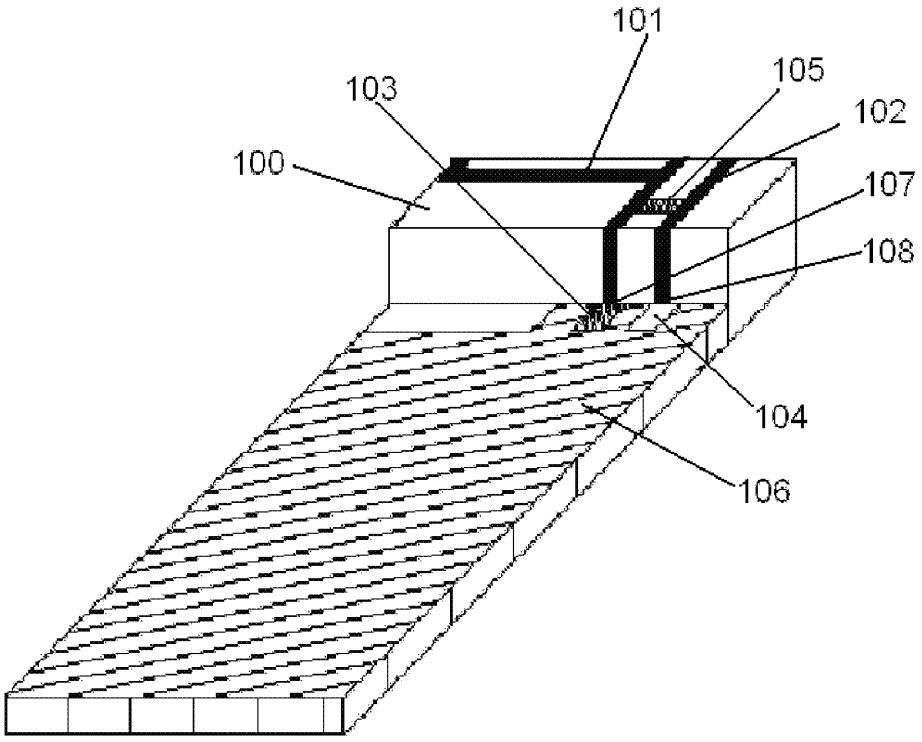
(51) **Int. Cl.**

H01Q 5/00	(2006.01)
H01Q 1/24	(2006.01)
H01Q 1/38	(2006.01)

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

(57) **ABSTRACT**

The invention provides an antenna for wireless devices which improves matching of the main antenna element and parasitic antenna element in the antenna. The antenna of the invention comprises a main antenna element and a parasitic antenna element, the main antenna element and the parasitic antenna element being separated from each other, a matching element is connected between the main antenna element and the parasitic antenna element, with an end of the matching element being electrically connected to a conductor strip of the main antenna element, and the other end being electrically connected to a conductor strip of the parasitic antenna element. Optimized antenna performance can be achieved by adjusting position and value of the matching element.



US 20100149043A1

(19) **United States**

(12) **Patent Application Publication**

TSAI et al.

(10) **Pub. No.: US 2010/0149043 A1**

(43) **Pub. Date: Jun. 17, 2010**

(54) **ANTENNA DEVICE FOR WIRELESS WIDE AREA NETWORK (WWAN) AND WIRELESS LOCAL AREA NETWORK (WLAN)**

(76) Inventors: **Tiao-Hsing TSAI**, Tao Yuan Shien (TW); **Chih-Wei LIAO**, Tao Yuan Shien (TW); **Chao-Hsu WU**, Tao Yuan Shien (TW)

Correspondence Address:
LADAS & PARRY LLP
224 SOUTH MICHIGAN AVENUE, SUITE 1600
CHICAGO, IL 60604 (US)

(21) Appl. No.: **12/423,045**

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

(30) **Foreign Application Priority Data**

Dec. 15, 2008 (TW) 097148751

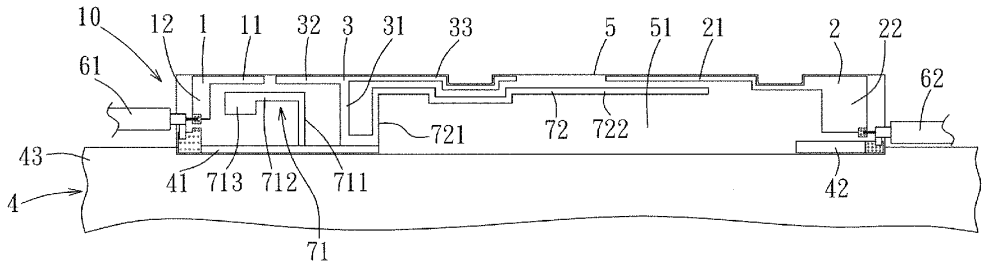
Publication Classification

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

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

(57) **ABSTRACT**

An antenna device includes a grounding element, a radiating element, and first and second feeding elements. The radiating element includes a first segment that extends from the grounding element and that has an end distal from the grounding element, and second and third segments that extend from the end of the first segment in opposite directions. Each of the first and second feeding elements includes first and second segments. The first segment of each of the first and second feeding elements is disposed proximate to a respective one of the second and third segments of the radiating element. The second segment of each of the first and second feeding elements is disposed proximate to the grounding element.



US 20100149044A1

(19) **United States**

(12) **Patent Application Publication**

Tsai et al.

(10) **Pub. No.: US 2010/0149044 A1**

(43) **Pub. Date: Jun. 17, 2010**

(54) **SMALL-SIZED ANTENNA**

(75) Inventors: **Tiao-Hsing Tsai**, Yunghe City (TW); **Chun-Ren Lin**, Niaosong Township (TW); **Chi-Yin Fang**, Pingtung City (TW); **Chih-Wei Liao**, Su-ao Township (TW)

Correspondence Address:
HAMMER & ASSOCIATES, P.C.
3125 SPRINGBANK LANE, SUITE G
CHARLOTTE, NC 28226 (US)

(73) Assignee: **Quanta Computer Inc.**

(21) Appl. No.: **12/430,925**

(22) Filed: **Apr. 28, 2009**

(30) **Foreign Application Priority Data**

Dec. 15, 2008 (TW) 097148750

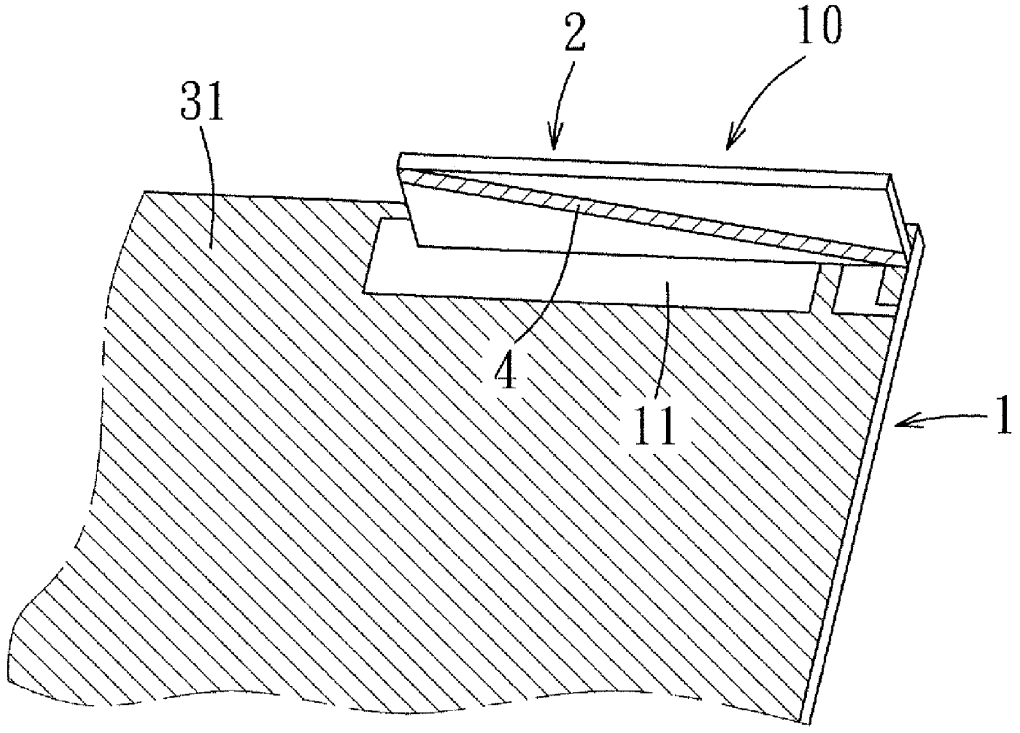
Publication Classification

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

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

(57) **ABSTRACT**

An antenna includes first and second dielectric substrates, a grounding element, and a radiating unit. The first dielectric substrate extends on a horizontal plane. The grounding element is formed on the first dielectric substrate. The second dielectric substrate extends on a vertical plane transverse to the horizontal plane and is disposed on the first dielectric substrate. The radiating unit is formed on the second dielectric substrate, and is provided with a feeding point, and a grounding point coupled to the grounding element.



US 20100149045A1

(19) **United States**

(12) **Patent Application Publication**

Kikuchi et al.

(10) **Pub. No.: US 2010/0149045 A1**

(43) **Pub. Date: Jun. 17, 2010**

(54) **COMMUNICATION TERMINAL APPARATUS**

(75) Inventors: **Hironori Kikuchi**, Miyagi (JP); **Kenichi Sato**, Miyagi (JP); **Nobuaki Tanaka**, Kanagawa (JP)

Correspondence Address:
Christensen O'Connor Johnson Kindness PLLC
1420 Fifth Avenue, Suite 2800
Seattle, WA 98101-2347 (US)

(73) Assignee: **PANASONIC CORPORATION**, Kadoma-shi,Osaka (JP)

(21) Appl. No.: **12/162,837**

(22) PCT Filed: **Jan. 30, 2007**

(86) PCT No.: **PCT/JP2007/051513**

§ 371 (c)(1),
(2), (4) Date: **Oct. 28, 2009**

(30) **Foreign Application Priority Data**

Feb. 10, 2006 (JP) 2006-034059

Publication Classification

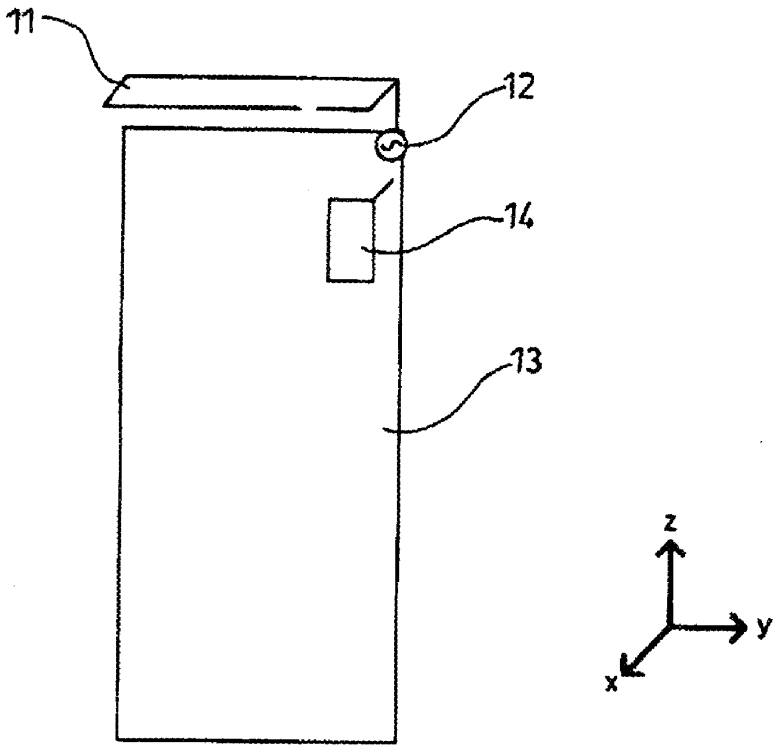
(51) **Int. Cl.**
H01Q 1/24 (2006.01)

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

(57) **ABSTRACT**

A problem of the invention is to provide a small-size communication terminal apparatus capable of reducing an SAR and also widening a band of an antenna and further achieving thinning.

The communication terminal apparatus has a substrate (**13**) disposed inside a housing, a power feeding part (**12**) disposed in the substrate (**13**), a monopole antenna (**11**) having plural elements of multi-frequency sharing, the monopole antenna for feeding power by electrically connecting one end to the power feeding part, and a ground wire (**14**) electrically connected to a wireless ground of the substrate (**13**), and the monopole antenna (**11**) having the plural elements is arranged in a direction vertical to a surface of the substrate (**13**) and in a back surface direction of the housing so as to be opposed to a human body at the time of a call.



US 20100149046A1

(19) **United States**

(12) **Patent Application Publication**

Huang et al.

(10) **Pub. No.: US 2010/0149046 A1**

(43) **Pub. Date: Jun. 17, 2010**

(54) **HANDHELD ELECTRONIC DEVICE**

(75) Inventors: **Huan-Chu Huang**, Taoyuan County (TW); **Jen-Chen Lu**, Taoyuan County (TW)

Correspondence Address:
JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100, ROOSEVELT ROAD, SECTION 2
TAIPEI 100 (TW)

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

(21) Appl. No.: **12/481,590**

(22) Filed: **Jun. 10, 2009**

(30) **Foreign Application Priority Data**

Dec. 17, 2008 (TW) 97149287

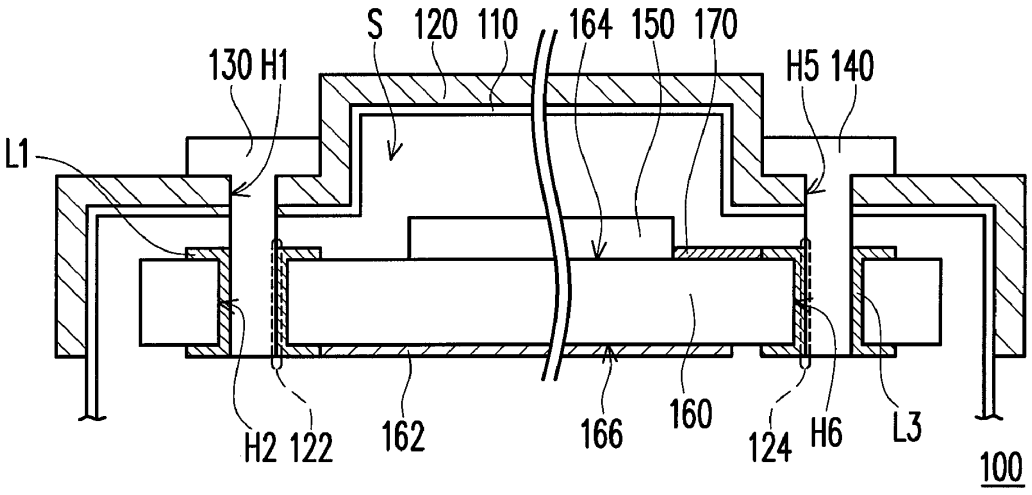
Publication Classification

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

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

(57) **ABSTRACT**

A handheld electronic device comprising an appearance provided with a containing space for disposing a communication module and a substrate having a ground plane; an antenna disposed on a surface of the appearance; and, a first fastening element and a second fastening element for fixing the appearance and the substrate. The first fastening element and the second fastening element electrically connect the antenna to the ground plane and the communication module.



US 20100149047A1

(19) **United States**

(12) **Patent Application Publication**

Tsujimura

(10) **Pub. No.: US 2010/0149047 A1**

(43) **Pub. Date: Jun. 17, 2010**

(54) **PORTABLE TERMINAL AND BUILT-IN ANTENNA**

(75) Inventor: **Akihiro Tsujimura**, Kokubunji-shi (JP)

Correspondence Address:
FRISHAUF, HOLTZ, GOODMAN & CHICK, PC
220 Fifth Avenue, 16TH Floor
NEW YORK, NY 10001-7708 (US)

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

(21) Appl. No.: **12/512,240**

(22) Filed: **Jul. 30, 2009**

(30) **Foreign Application Priority Data**

Dec. 12, 2008 (JP) 2008-317006

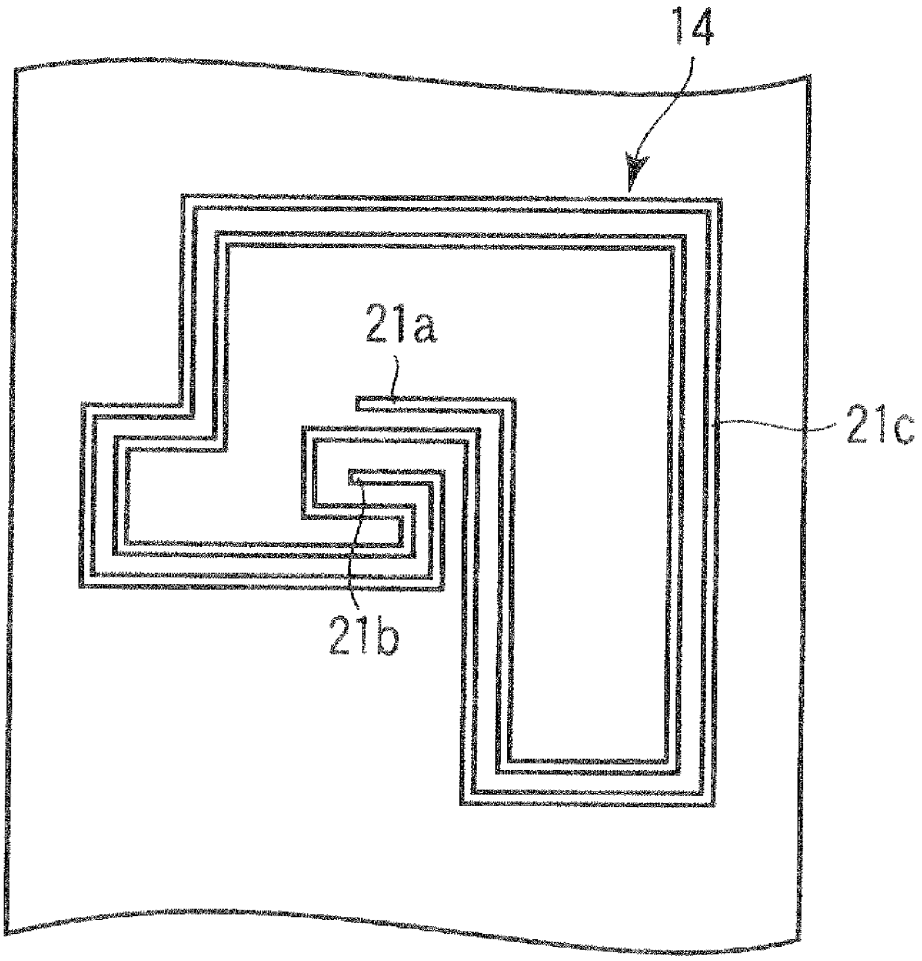
Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 1/40 (2006.01)

(52) **U.S. Cl.** **343/702**; 343/873

(57) **ABSTRACT**

A portable terminal includes a non-conductive resin chassis that is formed by molding a molding material and internally provided with a printed circuit board on which a wireless circuit is formed, and an antenna pattern that is disposed on a wall surface of the chassis and in a region excluding a eject pin track formed when the chassis electrically connected with the printed circuit board is formed, wherein the antenna pattern is constituted by sequentially laminating a copper layer, a nickel layer and a gold layer by electroless plating, and the nickel layer is rendered amorphous.



US 20100149048A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2010/0149048 A1**

(43) **Pub. Date: Jun. 17, 2010**

LIN

(54) **DUAL-BAND ANTENNA AND PORTABLE WIRELESS COMMUNICATION DEVICE EMPLOYING THE SAME**

(75) Inventor: **HSIEN-CHANG LIN**, Tu-Cheng (TW)

Correspondence Address:
PCE INDUSTRY, INC.
ATT. Steven Reiss
288 SOUTH MAYO AVENUE
CITY OF INDUSTRY, CA 91789 (US)

(73) Assignee: **Chi Mei Communication Systems, Inc.**, Tu-Cheng City (TW)

(21) Appl. No.: **12/536,313**

(22) Filed: **Aug. 5, 2009**

(30) **Foreign Application Priority Data**

Dec. 16, 2008 (CN) 200810306281.8

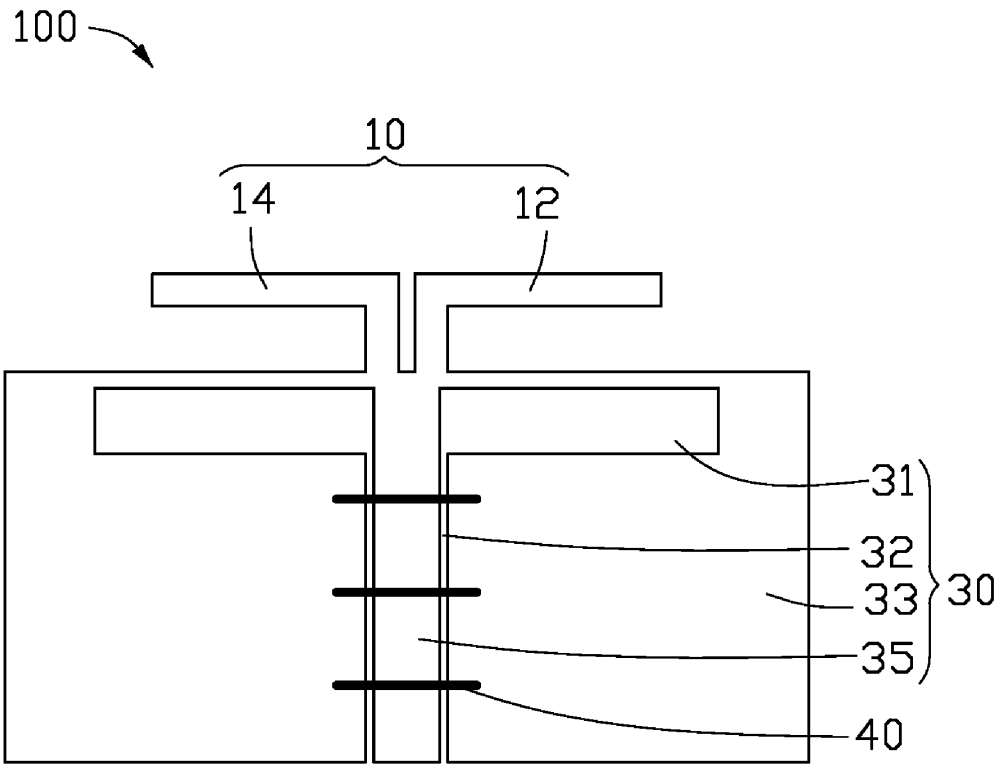
Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 1/38 (2006.01)
H01Q 13/10 (2006.01)

(52) **U.S. Cl.** ..... **343/702**; 343/700 MS; 343/767

(57) **ABSTRACT**

An exemplary dual-band antenna includes a first antenna unit and a second antenna unit for receiving /sending radio frequency signals corresponding generating a low resonant frequency and a high resonant frequency. The first antenna unit is perpendicularly connected to the second antenna unit. The second antenna unit includes a feed portion, two slots, two gaps and two grounding sheets. The feed portion is electrically connected to the first antenna unit and is used to receive radio frequency signals. The slots are adjacent to one side of the first antenna unit and are defined at the both sides of the feed portion, and the slots are connected with the feed portion and used to radiate radio frequency signals. The gaps extend away from a position of the first antenna unit and are defined at the both sides of the feed portion, and each gap communicates with corresponding slot. The grounding sheets are symmetrically positioned at both sides of the feed portion.



US 20100149049A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2010/0149049 A1

(43) Pub. Date: Jun. 17, 2010

Ryou et al.

(54) **BROADBAND ANTENNA OF DUAL RESONANCE**

(76) Inventors: **Byung Hoon Ryou**, Seoul (KR); **Won Mo Sung**, Gyeonggi-do (KR); **Jae Hoon Choi**, Seoul (KR); **Seong Gil Jeon**, Seoul (KR); **Kwang Woo Ryu**, Seoul (KR)

Correspondence Address:
BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040 (US)

(21) Appl. No.: **12/593,275**

(22) PCT Filed: **Apr. 3, 2008**

(86) PCT No.: **PCT/KR2008/001876**

§ 371 (c)(1),
(2), (4) Date: **Dec. 10, 2009**

(30) **Foreign Application Priority Data**

Apr. 4, 2007 (KR) 10-2007-0033058

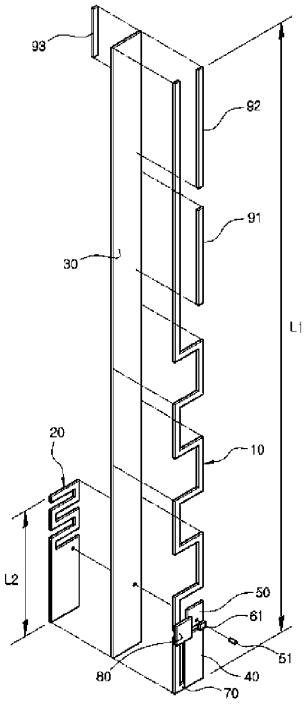
Publication Classification

(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 1/24 (2006.01)
H01Q 9/04 (2006.01)
H01Q 1/50 (2006.01)

(52) **U.S. Cl.** ..... **343/702**; 343/700 MS; 343/859

(57) **ABSTRACT**

Disclosed herein is a dual-resonance broadband antenna, and more particularly, to such a dual-resonance broadband antenna in which dual resonance is caused to occur using an antenna consisting of a strip line, a microstrip line or the like having a meander pattern so as to receive a signal for a wireless communication service at a relatively low frequency band, particularly, a signal with a terrestrial digital multimedia broadcasting (T-DMB) service frequency band of 174-216 MHz among a very high frequency (VHF) band. Particularly, the dual-resonance broadband antenna of the present invention is remarkably red used in its size (length) as compared to a general helical antenna, a monopole antenna, a dipole antenna or the like while using a wireless communication service at a relatively low frequency band, thereby achieving miniaturization thereof. Further, it is possible to improve quality and reliability of the small-sized dual-resonance broadband antenna according to the present invention as well as enhance the qualities of a portable terminal and a transmission and reception device for wireless communication employing the antenna according to the present invention.



US 20100149052A1

(19) **United States**

(12) **Patent Application Publication**

Nishio et al.

(10) **Pub. No.: US 2010/0149052 A1**

(43) **Pub. Date: Jun. 17, 2010**

(54) **ANTENNA DEVICE AND RADIO APPARATUS**

(75) Inventors: **Masaki Nishio**, Kanagawa-ken (JP); **Yukako Tsutsumi**, Kanagawa-ken (JP); **Takayoshi Ito**, Kanagawa-ken (JP)

Correspondence Address:
NIXON & VANDERHYE, PC
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203 (US)

(73) Assignee: **Kabushiki Kaisha Toshiba**, Tokyo (JP)

(21) Appl. No.: **12/654,271**

(22) Filed: **Dec. 15, 2009**

(30) **Foreign Application Priority Data**

Dec. 17, 2008 (JP) 2008-320669

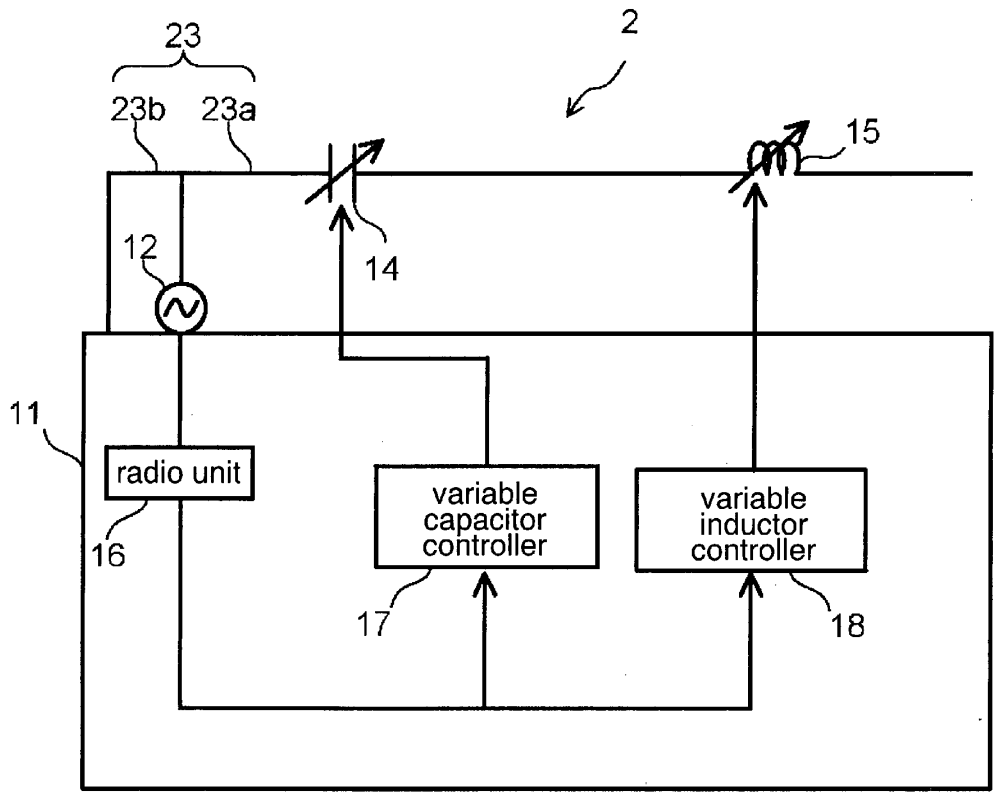
Publication Classification

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

(52) **U.S. Cl.** **343/702**; 343/745

(57) **ABSTRACT**

An antenna device includes an antenna element, a capacitor and a inductor. The antenna element has a length which is a quarter of a wavelength due to a first frequency. One end of the antenna element is connected to a feeding point. The other end of the antenna element is opened. The capacitor is arranged at a position having a distance which is equal or shorter than a half of a wavelength due to a second frequency from the other end of the antenna element. The inductor is arranged at a position having a distance which is equal or shorter than a quarter of the wavelength due to the second frequency from the other end of the antenna element.



US 20100149053A1

(19) **United States**

(12) **Patent Application Publication**

NAKANO et al.

(10) **Pub. No.: US 2010/0149053 A1**

(43) **Pub. Date: Jun. 17, 2010**

(54) **ANTENNA APPARATUS AND RADIO COMMUNICATION APPARATUS**

(75) Inventors: **Shinichi NAKANO**, Kanagawa-ken (JP); **Kazunari KAWAHATA**, Kanagawa-ken (JP); **Nobuhito TUBAKI**, Kanagawa-ken (JP); **Kenichi ISHIZUKA**, Kanagawa-ken (JP); **Shigeyuki FUJIEDA**, Ishikawa-ken (JP)

Correspondence Address:
Studebaker & Brackett PC
One Fountain Square, 11911 Freedom Drive, Suite 750
Reston, VA 20190 (US)

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

(21) Appl. No.: **12/710,945**

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

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2008/060962, filed on Jun. 16, 2008.

(30) **Foreign Application Priority Data**

Aug. 24, 2007 (JP) 2007-217968

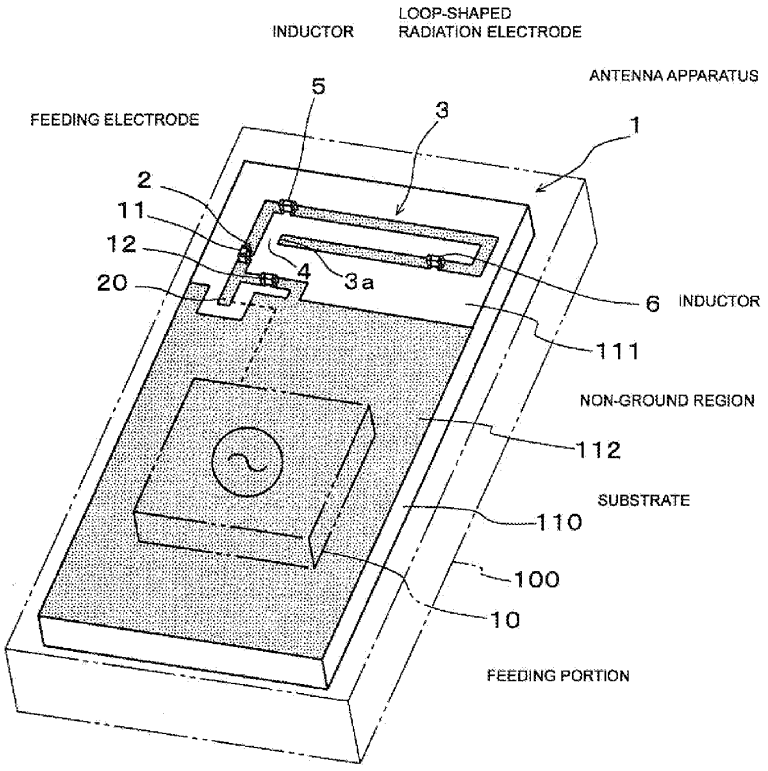
Publication Classification

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

(52) **U.S. Cl.** **343/702**; 343/722

(57) **ABSTRACT**

An antenna apparatus and a radio communication apparatus are capable of separately controlling a resonance frequency in a basic mode and a resonance frequency in a higher mode and have a wide bandwidth in which the resonance frequency in the basic mode is variable. The antenna apparatus includes a feeding electrode **2**, a loop-shaped radiation electrode **3**, a capacitance portion **4**, and inductors **5** and **6**. The capacitance portion **4** is formed by a gap between an open end **3***a* of the loop-shaped radiation electrode **3** and the feeding electrode **2**. The inductor **5** is disposed at a position where a large current is obtained in the basic mode and a small current is obtained in the higher mode. The inductor **6** is disposed at a position where a large current is obtained in the higher mode and a small current is obtained in the basic mode.



US 20100149063A1

(19) **United States**

(12) **Patent Application Publication**

CHAN et al.

(10) **Pub. No.: US 2010/0149063 A1**

(43) **Pub. Date: Jun. 17, 2010**

(54) **DUAL-FREQUENCY ANTENNA**

(75) Inventors: **Te-Jung CHAN**, Hsinchu City (TW); **Chih-Jen CHENG**, Taipei City (TW); **Jun-Zhi CHEN**, Banciao City (TW)

Correspondence Address:
Workman Nydegger
1000 Eagle Gate Tower
60 East South Temple
Salt Lake City, UT 84111 (US)

(73) Assignee: **SMARTANT TELECOM CO., LTD.**, Jhudong Township (TW)

(21) Appl. No.: **12/336,344**

(22) Filed: **Dec. 16, 2008**

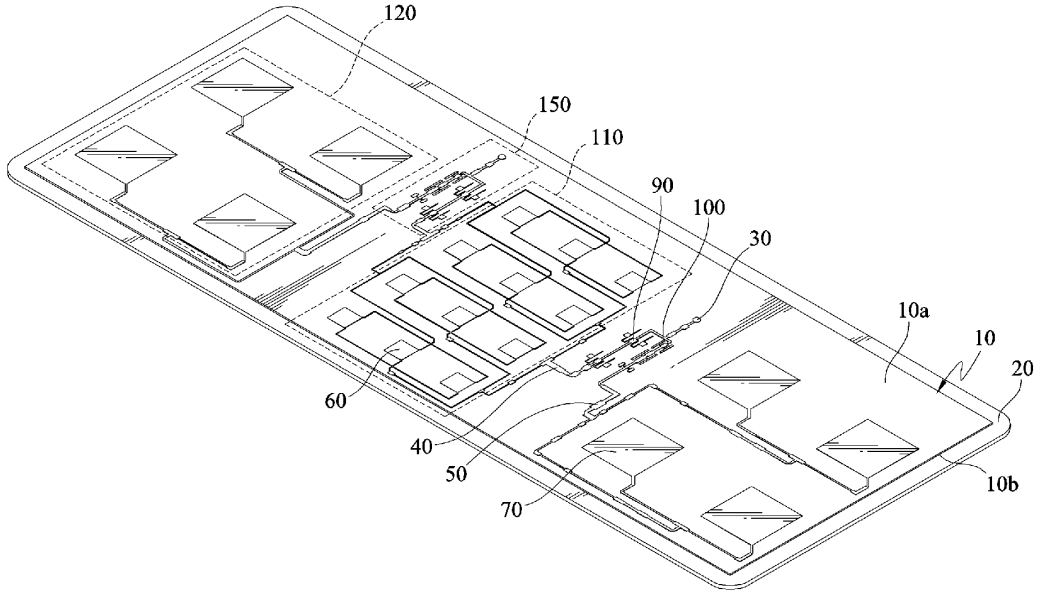
Publication Classification

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

(52) **U.S. Cl.** **343/845**

(57) **ABSTRACT**

A dual-frequency antenna includes a substrate, a ground layer, a plurality of signal feed portions, at least one first radiation portion, a plurality of second radiation portions, a plurality of first signal transmission lines, a plurality of second signal transmission lines, a plurality of first filters, and a plurality of second filters. The signal feed portions are disposed between the first radiation portions and the second radiation portions that are disposed on the first surface of the substrate in a staggered manner. The first signal transmission lines and the second signal transmission lines are respectively used to connect the signal feed portions with the first radiation portions and the second radiation portions. The first filters and the second filters are respectively disposed on the first signal transmission lines and the second signal transmission lines. The dual-frequency antenna is applicable for providing broadband and high gain features.



US 20100149064A1

(19) **United States**

(12) **Patent Application Publication**

Gala et al.

(10) **Pub. No.: US 2010/0149064 A1**

(43) **Pub. Date: Jun. 17, 2010**

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

(75) 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)

Correspondence Address:
WINSTEAD PC
P.O. BOX 50784
DALLAS, TX 75201 (US)

(73) Assignee: **Fractus, S.A.**, Barcelona (ES)

(21) Appl. No.: **12/316,460**

(22) Filed: **Dec. 12, 2008**

Related U.S. Application Data

(63) 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/EP2002/007002, filed on Jun. 25, 2002.

Publication Classification

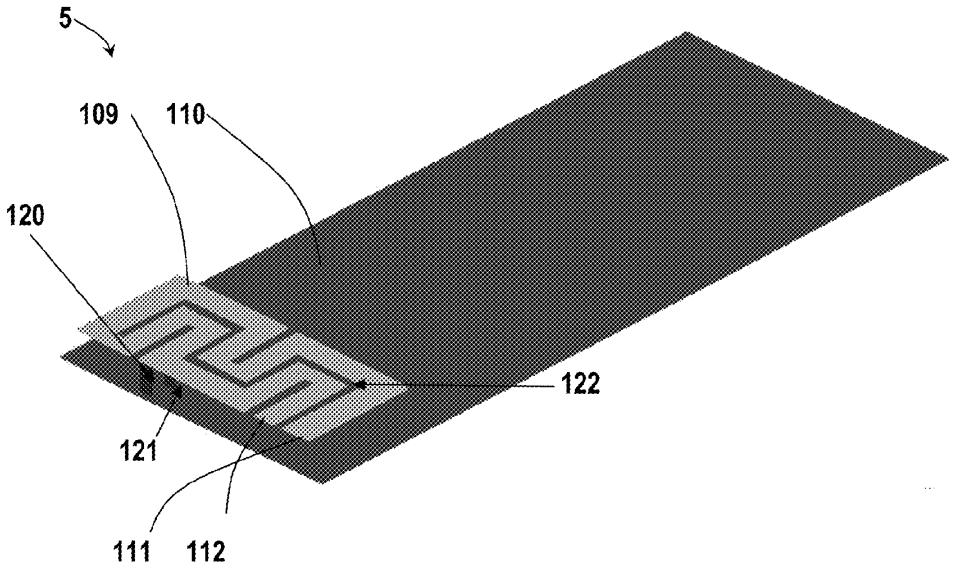
(51) **Int. Cl.**

H01Q 5/01	(2006.01)
H01Q 1/38	(2006.01)
H01Q 1/48	(2006.01)

(52) **U.S. Cl.** ..... **343/848**; 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 20100149065A1

(19) **United States**

(12) **Patent Application Publication**

Wong et al.

(10) **Pub. No.: US 2010/0149065 A1**

(43) **Pub. Date: Jun. 17, 2010**

(54) **MULTIBAND ANTENNA**

(76) Inventors: **Kin-Lu Wong**, Hsichih (TW); **Cheng-Tse Lee**, Hsichih (TW)

Correspondence Address:
KAMRATH & ASSOCIATES P.A.
4825 OLSON MEMORIAL HIGHWAY, SUITE 245
GOLDEN VALLEY, MN 55422 (US)

(21) Appl. No.: **12/403,462**

(22) Filed: **Mar. 13, 2009**

(30) **Foreign Application Priority Data**

Dec. 12, 2008 (TW) 097148561

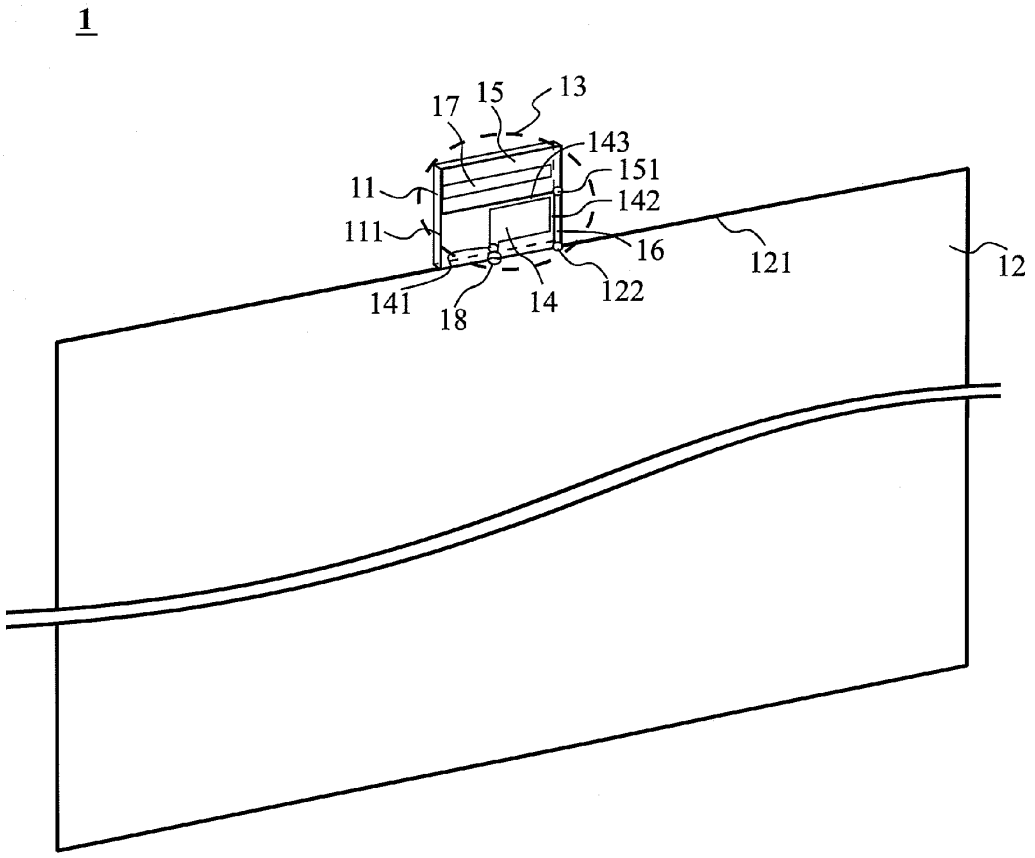
Publication Classification

(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 1/48 (2006.01)
H01Q 1/36 (2006.01)

(52) **U.S. Cl.** ..... **343/848**; 343/700 MS

(57) **ABSTRACT**

A multiband antenna comprises a ground plane, a substrate, and a radiating metal element, wherein a side of the substrate is substantially adjacent to a side of the ground plane; the radiating metal element is on a surface of the substrate. The radiating metal element comprises a radiating portion having a slit, a shorting portion having a first end electrically connected to the radiating portion and a second end electrically connected to the ground plane, and a feeding portion; the feeding portion comprises an antenna feeding point for electrically connecting to a signal source, wherein a first spacing is formed between the feeding portion and the radiating portion, and a second spacing is formed between the feeding portion and the shorting portion.



US 20100149068A1

(19) **United States**

(12) **Patent Application Publication**

Petersson et al.

(10) **Pub. No.: US 2010/0149068 A1**

(43) **Pub. Date: Jun. 17, 2010**

(54) **DUAL POLARIZED ANTENNA WITH NULL-FILL**

(76) Inventors: **Sven Petersson**, Savedalen (SE); **Anders Derneryd**, Goteborg (DE); **Ulrika Engström**, Floda (SE); **Martin Johansson**, Molndal (SE); **Lars Manholm**, Goteborg (SE)

Correspondence Address:
ERICSSON INC.
6300 LEGACY DRIVE, M/S EVR 1-C-11
PLANO, TX 75024 (US)

(21) Appl. No.: **12/598,817**

(22) PCT Filed: **May 4, 2007**

(86) PCT No.: **PCT/SE07/50302**

§ 371 (c)(1),
(2), (4) Date: **Nov. 4, 2009**

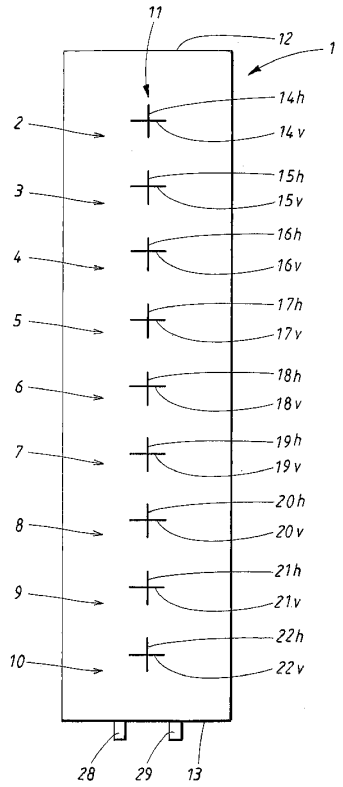
Publication Classification

(51) **Int. Cl.**
H01Q 21/26 (2006.01)

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

(57) **ABSTRACT**

The present invention relates to a dual polarized array antenna comprising at least two dual polarized antenna elements being arranged for radiating electromagnetic energy having a first polarization, constituting a first antenna radiation pattern, via a connection to a first antenna port, and electromagnetic energy having a second polarization, constituting a second antenna radiation pattern, via a connection to a second antenna port, the second polarization being orthogonal to the first polarization, the first antenna radiation pattern and second antenna radiation pattern each having a main beam and a number of side-lobes with nulls. The array antenna comprises at least one further dual polarized antenna element arranged for radiating electromagnetic energy having two mutually orthogonal polarizations, constituting further antenna radiation patterns, via respective connections to the first antenna port and the second antenna port, where the polarization of said at least one further dual polarized antenna element that is associated with the first antenna port deviates from the first polarization such that said at least one null of the first antenna pattern is at least partly filled.



US 20100149069A1

(19) **United States**

(12) **Patent Application Publication**

Kim

(10) **Pub. No.: US 2010/0149069 A1**

(43) **Pub. Date: Jun. 17, 2010**

(54) **MULTI BAND BUILT-IN ANTENNA**

(75) Inventor: **Byong-Nam Kim**, Bucheon (KR)

Correspondence Address:
LRK Patent Law Firm
1952 Gallows Rd, Suite 200
Vienna, VA 22182 (US)

(73) Assignee: **ACE ANTENNA CORP.**, Incheon (KR)

(21) Appl. No.: **12/530,212**

(22) PCT Filed: **Mar. 10, 2008**

(86) PCT No.: **PCT/KR2008/001340**

§ 371 (c)(1),
(2), (4) Date: **Jan. 19, 2010**

(30) **Foreign Application Priority Data**

Mar. 8, 2007 (KR) 10-2007-0022850

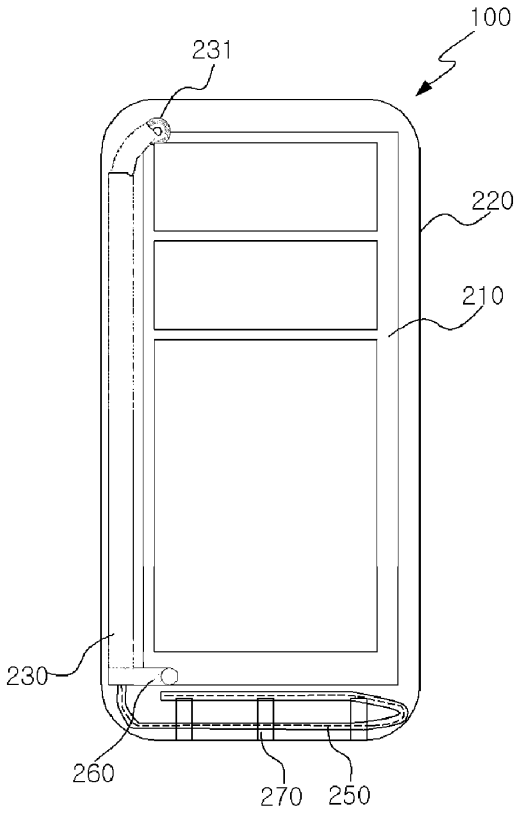
Publication Classification

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

(52) **U.S. Cl.** ..... **343/904**; 343/700 MS

(57) **ABSTRACT**

A multi-band built-in antenna for a mobile communication terminal having a main board and a casing for protecting the main board, is disclosed. A transmission line is formed to be spaced apart from one outside surface of the main board by a predetermined interval and configured to include an external conductor, a dielectric, and a central conductor so as to transmit signals. A ground clip is configured to ground the transmission line by fastening the transmission line. A radiator is formed by bending the dielectric and central conductor of the transmission line, other than the external conductor of the transmission line, and is configured to operate in multiple bands. An open stub is connected to the ground clip, is bent a plurality of times, and is configured to be operated in a low frequency band, which is lower than the high frequency band.



US 20100149751A1

(19) **United States**

(12) **Patent Application Publication**

Camacho et al.

(10) **Pub. No.: US 2010/0149751 A1**

(43) **Pub. Date: Jun. 17, 2010**

(54) **ELECTRONIC DEVICE ANTENNA**

(76) Inventors: **Eduardo Lopez Camacho**, Watsonville, CA (US); **Bing Chiang**, Cupertino, CA (US); **Douglas B. Kough**, San Jose, CA (US); **Hao Xu**, Cupertino, CA (US)

Correspondence Address:
Treyz Law Group
870 Market Street, Suite 984
SAN FRANCISCO, CA 94102 (US)

(21) Appl. No.: **12/337,499**

(22) Filed: **Dec. 17, 2008**

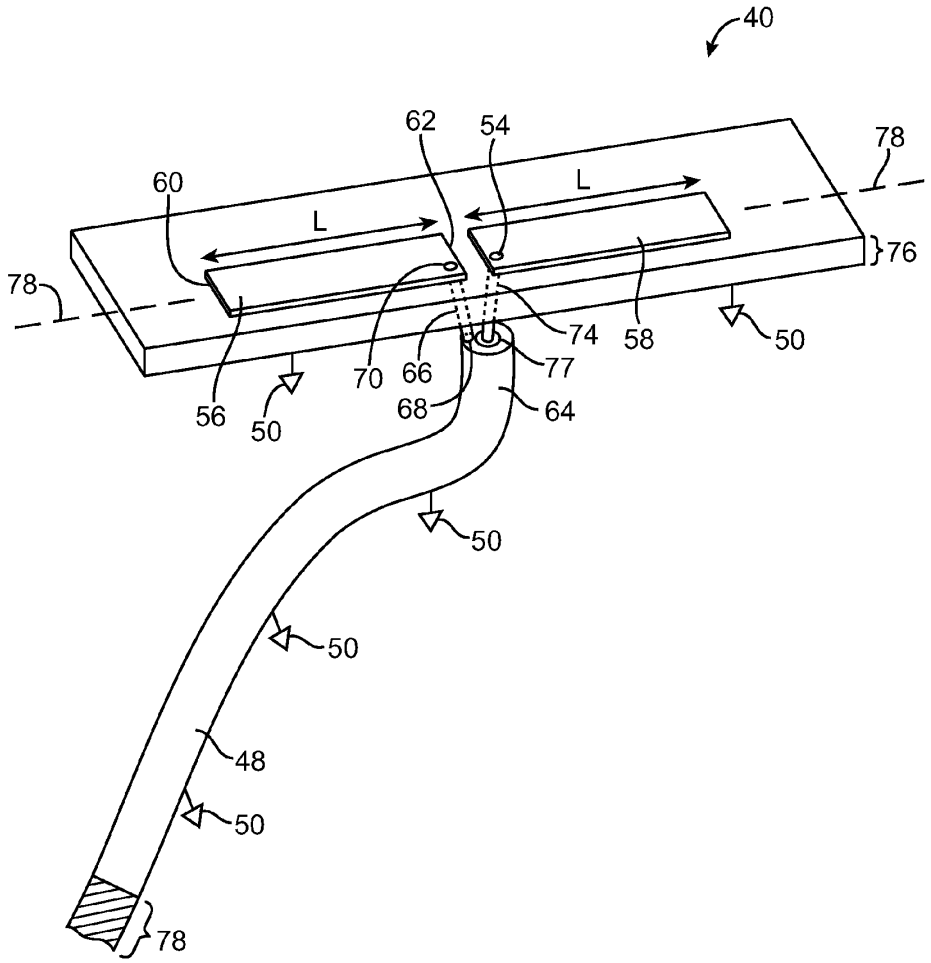
Publication Classification

(51) **Int. Cl.**
G06F 1/16 (2006.01)
H01Q 1/24 (2006.01)
H01Q 1/38 (2006.01)

(52) **U.S. Cl.** ..... **361/679.55**; 343/702; 343/700 MS

(57) **ABSTRACT**

Antennas for electronic devices such as portable computers are provided. An antenna may have a dipole structure in which one antenna element serves as a matching element and another antenna element serves as a radiating element. The antenna elements may be mounted on a substrate. The substrate may be mounted on a support structure that is attached to a grounding plate. The grounding plate may be grounded to a conductive housing portion of a portable computer. The antenna may be mounted within the conductive housing in the vicinity of an opening in the housing. The opening may be a slot opening that is used to accommodate optical disks or other storage media. Radio-frequency signals for the antenna may pass through the opening.



US 20100156724A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2010/0156724 A1

(43) Pub. Date: Jun. 24, 2010

NORO et al.

(54) ANTENNA APPARATUS

(75) Inventors: **Junichi NORO**, Akita-shi (JP); **Kazunari Saito**, Akita-shi (JP); **Akira Miyoshi**, Sagamihara-shi (JP); **Hiroshi Suzuki**, Akita-shi (JP)

Correspondence Address:
FRISHAUF, HOLTZ, GOODMAN & CHICK, PC
220 Fifth Avenue, 16TH Floor
NEW YORK, NY 10001-7708 (US)

(73) Assignee: **Mitsumi Electric Co., Ltd.**, Tokyo (JP)

(21) Appl. No.: **12/427,874**

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

(30) **Foreign Application Priority Data**

Dec. 18, 2008 (JP) 2008-322030

Publication Classification

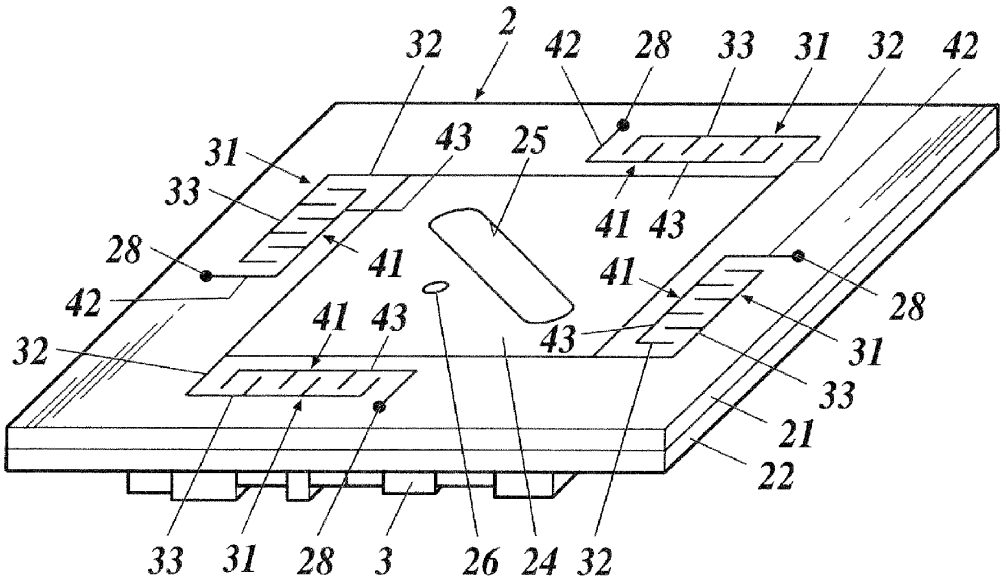
(51) **Int. Cl.**
H01Q 1/38 (2006.01)

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

(57) **ABSTRACT**

Disclosed is an antenna apparatus, including: a multi-layer substrate having at least two substrates in a stacking manner and having a first through hole; an amplifying circuit on one face of the multi-layer substrate; a ground pattern formed between two adjacent substrates of the multi-layer substrate; an antenna pattern formed on the other face of the multi-layer substrate; and a first comb electrode having comb teeth and a second comb electrode having comb teeth, both of which are formed around the antenna pattern on the other face of the multi-layer substrate. The first comb electrode is electrically connected to the antenna pattern. The second comb electrode is electrically connected to the ground pattern through the first through hole. The comb teeth of the first comb electrode and the comb teeth of the second comb electrode are spaced from one another at predetermined intervals in a staggered manner.

1



US 20100156725A1

(19) **United States**

(12) **Patent Application Publication**

Legay et al.

(10) **Pub. No.: US 2010/0156725 A1**

(43) **Pub. Date: Jun. 24, 2010**

(54) **DUAL POLARIZATION PLANAR RADIATING ELEMENT AND ARRAY ANTENNA COMPRISING SUCH A RADIATING ELEMENT**

(75) Inventors: **Hervé Legay**, Plaisance du Touch (FR); **Danièle Bresciani**, Toulouse (FR); **Renaud Chiniard**, Mourvilles Basses (FR)

Correspondence Address:
BAKER & HOSTETLER LLP
WASHINGTON SQUARE, SUITE 1100, 1050 CONNECTICUT AVE. N.W.
WASHINGTON, DC 20036-5304 (US)

(73) Assignee: **Thales**, Neuilly/Sur/Seine (FR)

(21) Appl. No.: **12/578,831**

(22) Filed: **Oct. 14, 2009**

(30) **Foreign Application Priority Data**

Dec. 23, 2008 (FR) 0807401

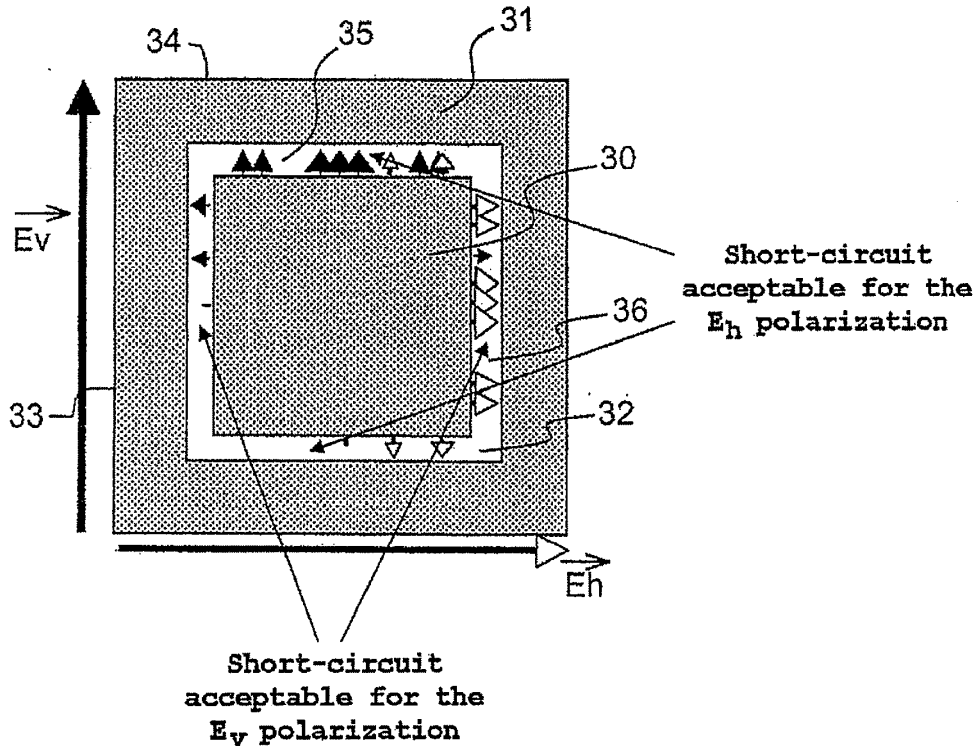
Publication Classification

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

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

(57) **ABSTRACT**

A dual-polarization planar radiating element having an external metal grid, at least one metal patch concentric with the external metal grid and a cavity separating the metal grid and the metal patch, the grid and the patch having a polygonal shape delimited by at least four pairwise opposite sides, and two orthogonal directions of polarization associated with two orthogonal electric fields Ev and Eh, at least one of the directions of polarization being parallel to two sides of the polygon. Each side of the metal patch parallel to a direction of polarization is linked electrically to a zone of the external grid where one of the electric fields Ev or Eh is a minimum. The invention exhibits the advantage of reducing the phenomenon of electrostatic discharges in the planar radiating elements without significantly modifying the response of the radiating element subjected to an orthogonally polarized wave.



US 20100156726A1

(19) **United States**

(12) **Patent Application Publication**

Montgomery et al.

(10) **Pub. No.: US 2010/0156726 A1**

(43) **Pub. Date: Jun. 24, 2010**

(54) **DUAL FEED ANTENNA**

(75) Inventors: **Mark T. Montgomery**, Melbourne Beach, FL (US); **Paul A. Tornatta, JR.**, Melbourne, FL (US)

Correspondence Address:
FOLEY HOAG, LLP
PATENT GROUP, WORLD TRADE CENTER WEST
155 SEAPORT BLVD
BOSTON, MA 02110 (US)

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

(21) Appl. No.: **12/644,718**

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

Related U.S. Application Data

(60) Provisional application No. 61/140,370, filed on Dec. 23, 2008.

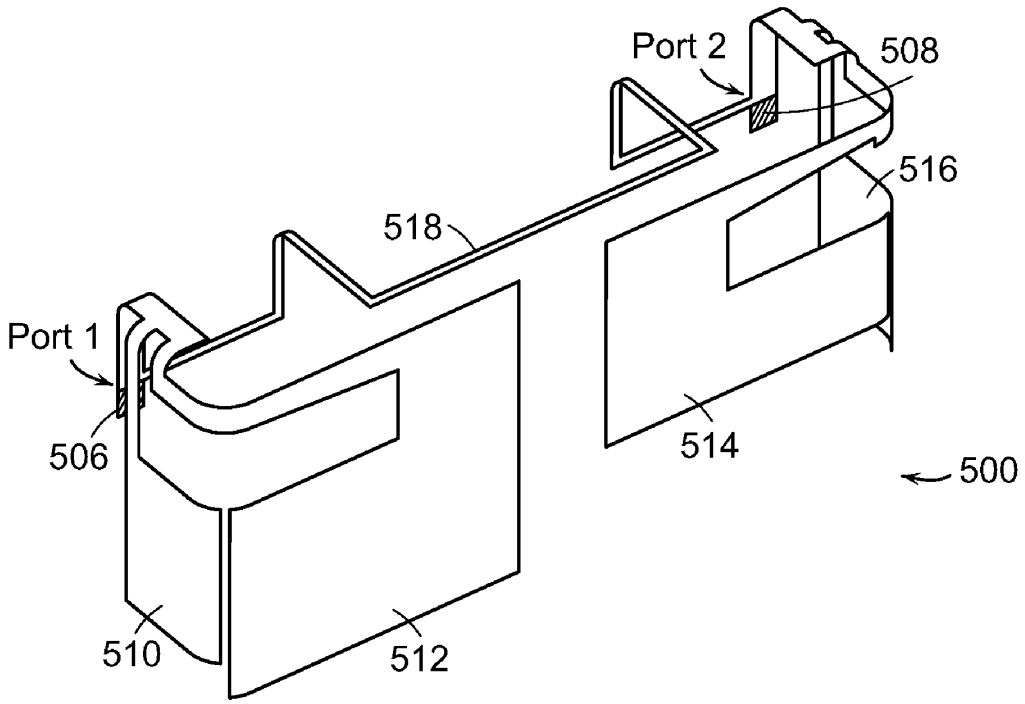
Publication Classification

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

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

(57) **ABSTRACT**

A multi-port antenna structure for a wireless-enabled communications device includes a coupler-antenna having a first antenna port for transmitting electromagnetic signals and a second antenna port for receiving electromagnetic signals. The coupler-antenna is positioned on a chassis of the wireless enabled communications device to transmit energy between the chassis and the first and second antenna ports. Resonant modes of the chassis for one antenna port are orthogonal to resonant modes of the chassis for the other antenna port, such that the first and second antenna ports are isolated from each other.



US 20100156728A1

(19) **United States**

(12) **Patent Application Publication**

ALVEY et al.

(10) **Pub. No.: US 2010/0156728 A1**

(43) **Pub. Date: Jun. 24, 2010**

(54) **RADIO DEVICE AND SLOT ANTENNA WHICH FACILITATES OPERATION OF A USER INTERFACE ELEMENT**

(75) Inventors: **GRAHAM R. ALVEY**, SKOKIE, IL (US); **PAUL R. STEUER**, HAWTHORN WOODS, IL (US); **JAMES A. VAN BOSCH**, CRYSTAL LAKE, IL (US); **LOUIS J. VANNATTA**, CRYSTAL LAKE, IL (US)

Correspondence Address:
PATENTS ON DEMAND, P.A.-Motorola
4581 WESTON ROAD, SUITE 345
WESTON, FL 33331 (US)

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

(21) Appl. No.: **12/338,637**

(22) Filed: **Dec. 18, 2008**

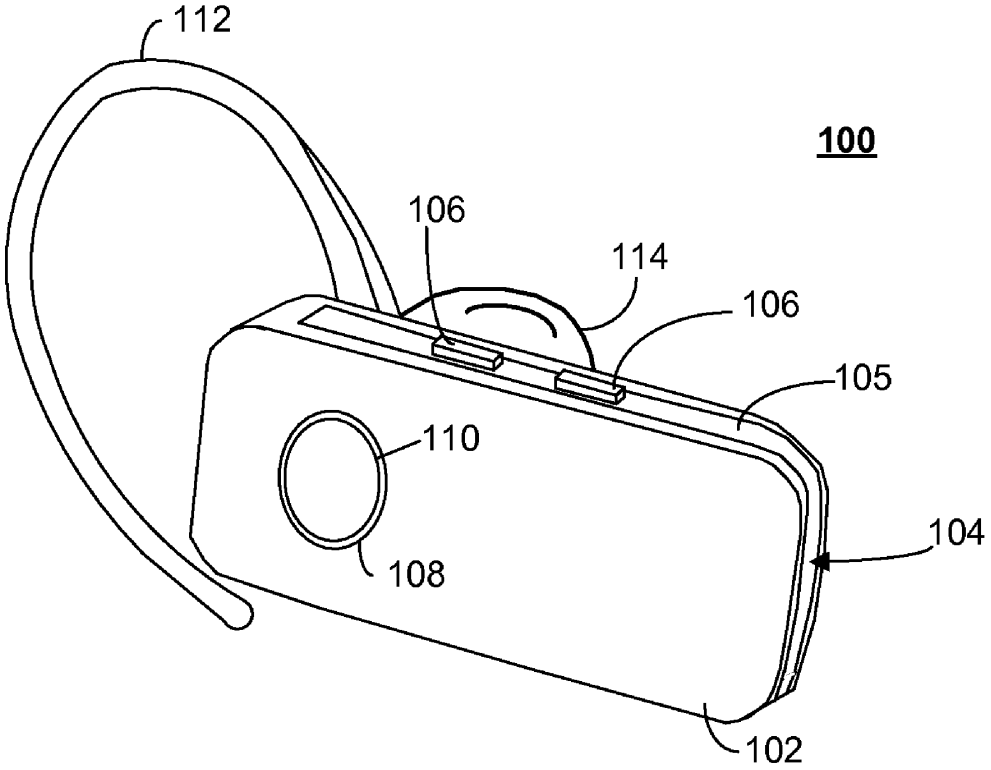
Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 13/10 (2006.01)

(52) **U.S. Cl.** **343/702**; 343/767

(57) **ABSTRACT**

A portable communication device (**100**, **800**, **900**) has an antenna element (**102**, **1206**). The antenna element forms a slot (**104**, **1208**) which is used as a slot antenna. The device is configured such that the slot facilitates operation of a user interface element through the slot.



US 20100156729A1

(19) **United States**

(12) **Patent Application Publication**

KUBO et al.

(10) **Pub. No.: US 2010/0156729 A1**

(43) **Pub. Date: Jun. 24, 2010**

(54) **MAGNETIC ANTENNA AND ANTENNA DEVICE**

(75) Inventors: **Hiroyuki KUBO**, Ishikawa-ken (JP); **Hiromitsu ITO**, Ishikawa-ken (JP); **Kuniaki YOSUI**, Ishikawa-ken (JP)

Correspondence Address:
Studebaker & Brackett PC
One Fountain Square, 11911 Freedom Drive, Suite 750
Reston, VA 20190 (US)

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

(21) Appl. No.: **12/646,468**

(22) Filed: **Dec. 23, 2009**

(30) **Foreign Application Priority Data**

Dec. 24, 2008 (JP) 2008-327416

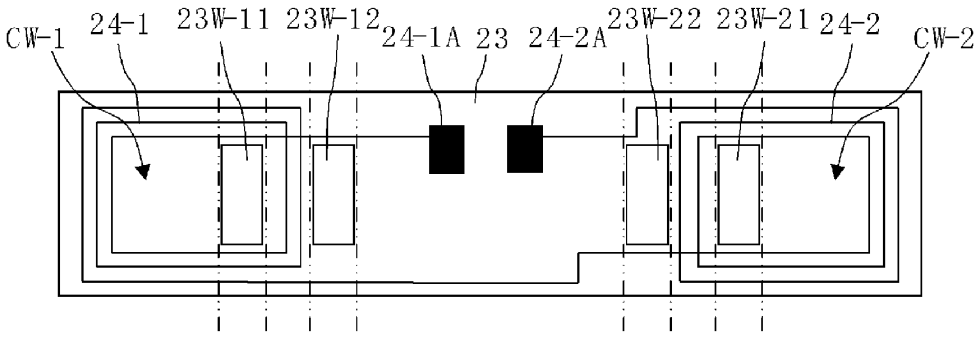
Publication Classification

(51) **Int. Cl.**
H01Q 7/08 (2006.01)
H01Q 1/22 (2006.01)

(52) **U.S. Cl.** **343/702**; 343/788

(57) **ABSTRACT**

There is provided a magnetic antenna and an antenna device that increase the packaging density of a portion where the magnetic antenna is mounted in an electronic apparatus, and suppresses degradation of antenna performance. A flexible substrate has first and second substantially spiral-shaped coil conductors formed thereon. Conductor-opening-side through holes are formed in the respective conductor openings of the coil conductors, and non-coil-conductor-forming-area through holes are formed in areas in which the coil conductors are not formed. First and second magnetic cores are arranged so as to extend through the respective conductor-opening-side through holes from a first main surface of the flexible substrate and to extend through the respective non-coil-conductor-forming-area through holes in a direction from a second main surface side to the first main surface of the flexible substrate.



US 20100156731A1

(19) **United States**

(12) **Patent Application Publication**

BYUN et al.

(10) **Pub. No.: US 2010/0156731 A1**

(43) **Pub. Date: Jun. 24, 2010**

(54) **SLOT ANTENNA WITH STUBS**

(75) Inventors: **Woo Jin BYUN**, Daejeon-city (KR); **Min Soo Kang**, Daejeon-city (KR); **Kwang Seon Kim**, Daejeon-city (KR); **Bong Su Kim**, Daejeon-city (KR); **Tae Jin Chung**, Seoul (KR); **Myung Sun Song**, Seoul (KR)

Correspondence Address:
STAAS & HALSEY LLP
SUITE 700, 1201 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005 (US)

(73) Assignee: **ELECTRONICS AND TELECOMMUNICATIONS RESEARCH INSTITUTE**, Daejeon-city (KR)

(21) Appl. No.: **12/613,193**

(22) Filed: **Nov. 5, 2009**

(30) **Foreign Application Priority Data**

Dec. 22, 2008 (KR) 10-2008-0131182

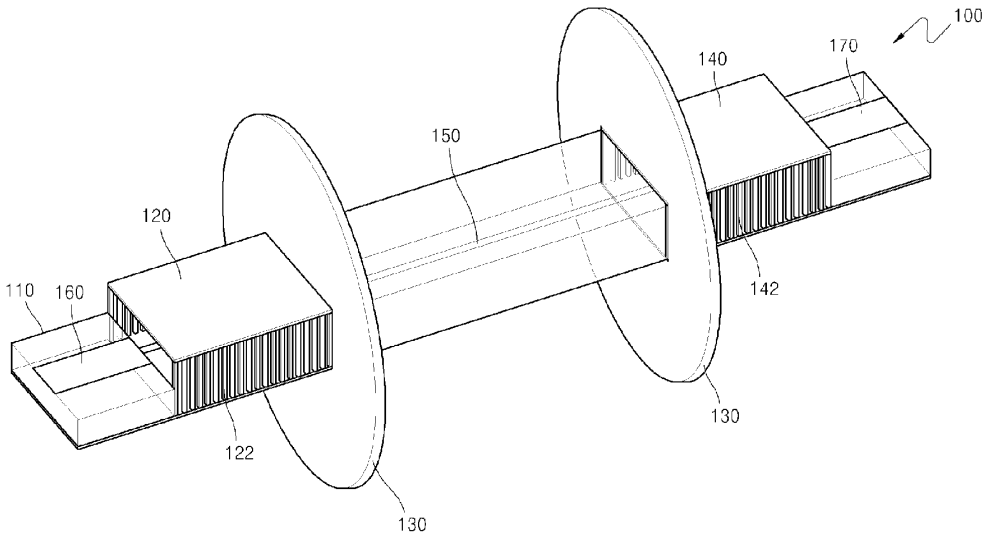
Publication Classification

(51) **Int. Cl.**
H01Q 1/00 (2006.01)
H01Q 13/10 (2006.01)

(52) **U.S. Cl.** **343/739**; 343/767

(57) **ABSTRACT**

A slot antenna having stubs is provided, in which a strip transmission line for transmitting a transverse electromagnetic mode (TEM) signal is formed by using a multi-layered substrate, and a plurality of slots are used for the strip transmission line. Thus, an omnidirectional radiation pattern is obtained, and the directivity of the slot antenna is improved.



US 20100156733A1

(19) **United States**

(12) **Patent Application Publication**

Kato et al.

(10) **Pub. No.: US 2010/0156733 A1**

(43) **Pub. Date: Jun. 24, 2010**

(54) **CHIP ANTENNA AND ITS PRODUCTION METHOD, AND ANTENNA APPARATUS AND COMMUNICATIONS APPARATUS COMPRISING SUCH CHIP ANTENNA**

(75) Inventors: **Tomotsugu Kato**, Kumagaya-shi (JP); **Masayuki Gonda**, Kumagaya-shi (JP); **Hiroyuki Aoyama**, Kumagaya-shi (JP); **Hideto Mikami**, Kumagaya-shi (JP)

Correspondence Address:
SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W., SUITE 800
WASHINGTON, DC 20037 (US)

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

(21) Appl. No.: **12/663,240**

(22) PCT Filed: **Jun. 9, 2008**

(86) PCT No.: **PCT/JP2008/060572**

§ 371 (c)(1),
(2), (4) Date: **Jan. 29, 2010**

(30) **Foreign Application Priority Data**

Jun. 7, 2007 (JP) 2007-151689

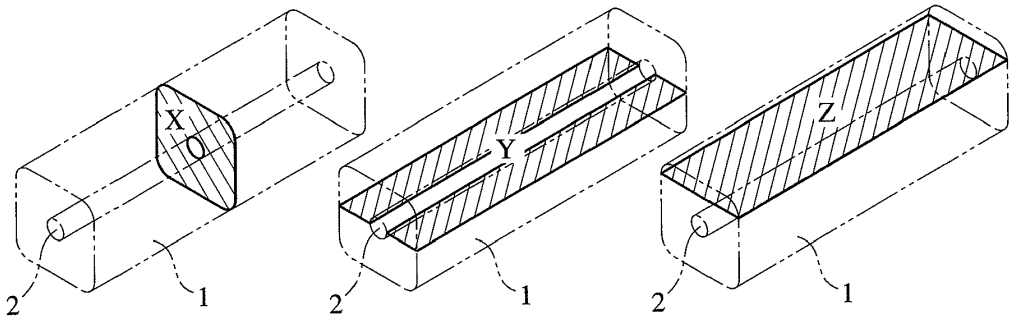
Publication Classification

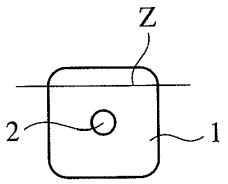
(51) **Int. Cl.**
H01Q 1/00 (2006.01)
D01F 1/08 (2006.01)

(52) **U.S. Cl.** **343/787**; 264/171.26

(57) **ABSTRACT**

A chip antenna comprising a magnetic substrate comprising Z-type ferrite or Y-type ferrite as a main phase and having a through-hole extending linearly along a center axis, and a conductor penetrating the through-hole, the magnetic phase having a c-axis substantially parallel or perpendicular to the through-hole.





US 20100156735A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2010/0156735 A1

(43) Pub. Date: Jun. 24, 2010

NAKAMURA et al.

(54) **ANTENNA UNIT AND MOBILE TERMINAL THEREWITH**

(75) Inventors: **Kouichi NAKAMURA**, Miyazaki (JP); **Takumi NARUSE**, Miyazaki (JP); **Fumio FUKUSHIMA**, Miyazaki (JP); **Kuniaki KIYOSUE**, Miyazaki (JP)

Correspondence Address:
GREENBLUM & BERNSTEIN, P.L.C.
1950 ROLAND CLARKE PLACE
RESTON, VA 20191 (US)

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

(21) Appl. No.: **12/639,238**

(22) Filed: **Dec. 16, 2009**

(30) **Foreign Application Priority Data**

Dec. 17, 2008 (JP) 2008-320450
Feb. 28, 2009 (JP) 2009-043366

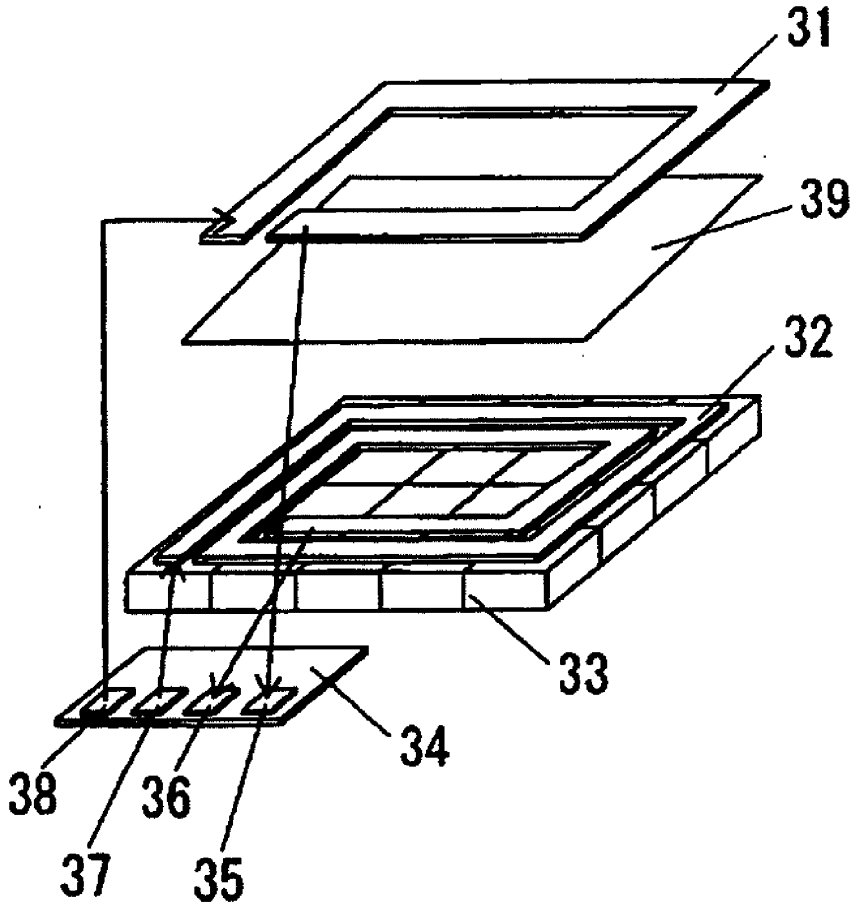
Publication Classification

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

(52) **U.S. Cl.** **343/788**

(57) **ABSTRACT**

An antenna unit includes an antenna formed on a magnetic sheet. A transmission circuit includes an inductor, a matching capacitor, and the antenna connected in series, and a reception circuit includes the antenna, the matching capacitor, a resistor, and a capacitor connected in series. The antenna is formed as one turn, and the size of the antenna and the resistor involves a predetermined relationship.



US 20100156736A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2010/0156736 A1

(43) Pub. Date: Jun. 24, 2010

Chung et al.

(54) **DIPOLE ANTENNA**

(75) Inventors: **Shyh-Jong Chung**, Hsinchu City (TW); **Ching-Wei Ling**, Tainan County (TW); **Yi-Shiang Ma**, Changhua County (TW)

Correspondence Address:
JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100, ROOSEVELT ROAD, SECTION 2
TAIPEI 100 (TW)

(73) Assignee: **Industrial Technology Research Institute**, Hsinchu (TW)

(21) Appl. No.: **12/371,900**

(22) Filed: **Feb. 16, 2009**

(30) **Foreign Application Priority Data**

Dec. 23, 2008 (TW) 97150318

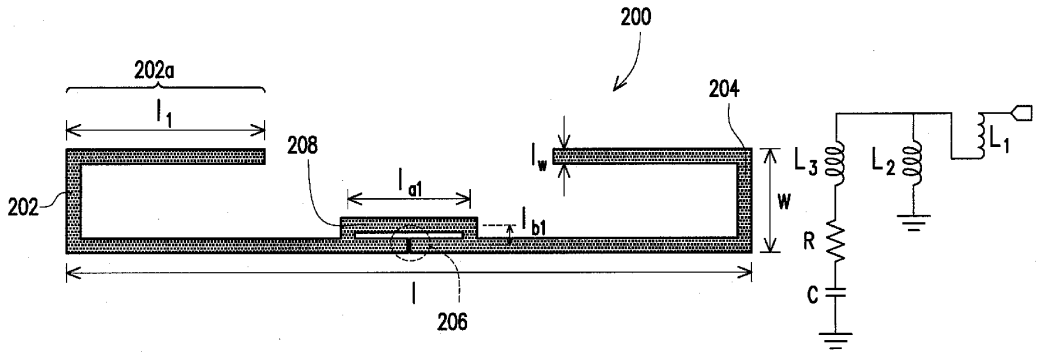
Publication Classification

(51) **Int. Cl.**
H01Q 9/16 (2006.01)

(52) **U.S. Cl.** **343/793**

(57) **ABSTRACT**

A dipole antenna used in an operation frequency includes a dipole radiation main body, a first semi-loop metal line and a second semi-loop metal line is provided. The dipole radiation main body has a first radiation line arm and a second radiation line arm aligned in a straight line, wherein a gap exists therebetween to form a feeding terminal. The first semi-loop metal line has two ends respectively connected to the first radiation line arm and the second radiation line arm to form a first matching loop covering the feeding terminal. The second semi-loop metal line has two ends respectively connected to the first radiation line arm and the second radiation line arm to form a second matching loop, which is larger than the first matching loop.



US 20100156737A1

(19) **United States**

(12) **Patent Application Publication**

Park et al.

(10) **Pub. No.: US 2010/0156737 A1**

(43) **Pub. Date: Jun. 24, 2010**

(54) **BROADBAND U-SHAPED RFID TAG ANTENNA WITH NEAR-ISOTROPIC CHARACTERISTICS**

(75) Inventors: **Ikmo Park**, Yongin-si (KR); **Sangwoon Lee**, Seoul (KR); **Hosung Choo**, Seoul (KR)

Correspondence Address:
THE NATH LAW GROUP
112 South West Street
Alexandria, VA 22314 (US)

(73) Assignee: **AJOU UNIVERSITY INDUSTRY COOPERATION FOUNDATION**, SUWON-SI (KR)

(21) Appl. No.: **12/588,253**

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

(30) **Foreign Application Priority Data**

Dec. 18, 2008 (KR) 10-2008-0129586

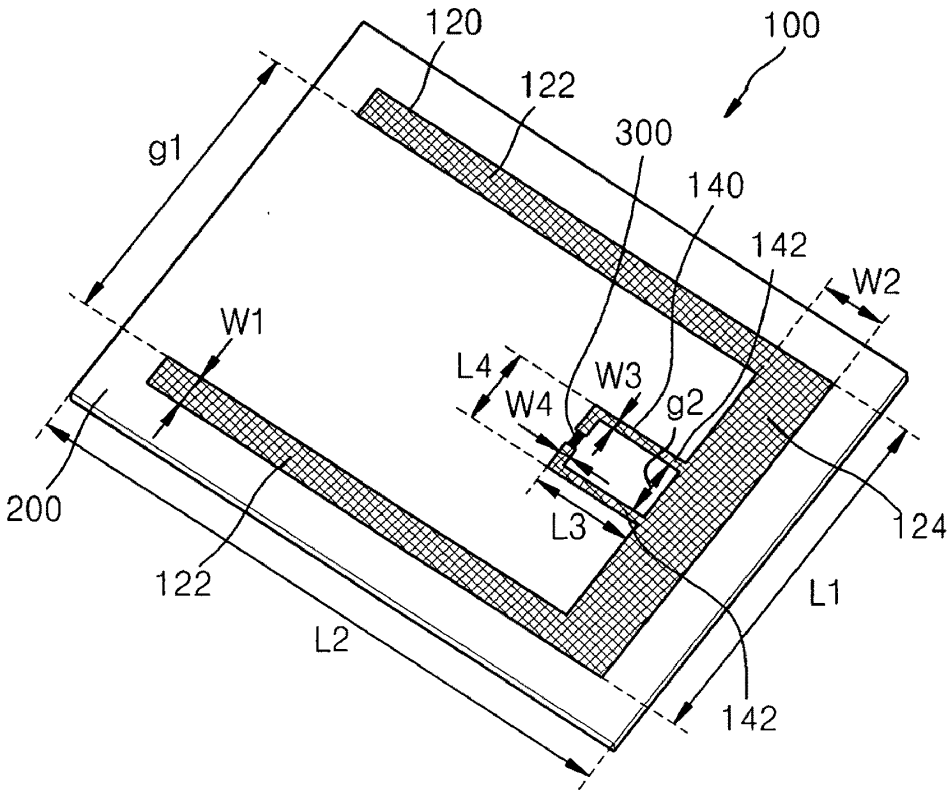
Publication Classification

(51) **Int. Cl.**
H01Q 9/28 (2006.01)

(52) **U.S. Cl.** **343/795**

(57) **ABSTRACT**

A radio frequency identification (RFID) tag antenna in a U shape, having constant near-isotropic characteristics in a broadband. The RFID tag antenna includes a dipole antenna in a U shape, including a plurality of first conducting wires having a first width and separated from and parallel to each other with a first gap and a second conducting wire having a second width and connecting the plurality of first conducting wires; and a feed unit connected to the second conducting wire and located between the plurality of first conducting wires. The RFID tag antenna further includes the dipole antenna in a U shape and the feed unit disposed in the dipole antenna in a U shape, thereby having the constant near-isotropic characteristics in the broadband.



US 20100156738A1

(19) **United States**

(12) **Patent Application Publication**

PU et al.

(10) **Pub. No.: US 2010/0156738 A1**

(43) **Pub. Date: Jun. 24, 2010**

(54) **ELECTROMAGNETIC RADIATION APPARATUS AND METHOD FOR FORMING THE SAME**

(75) Inventors: **TA CHUN PU**, KAOHSIUNG CITY (TW); **CHUN YIH WU**, TAICHUNG CITY (TW); **HUNG HSUAN LIN**, TAIPEI CITY (TW); **JUI HUNG CHEN**, TAICHUNG CITY (TW)

Correspondence Address:
WPAT, PC
INTELLECTUAL PROPERTY ATTORNEYS
2030 MAIN STREET, SUITE 1300
IRVINE, CA 92614 (US)

(73) Assignee: **INDUSTRIAL TECHNOLOGY RESEARCH INSTITUTE**, HSINCHU (TW)

(21) Appl. No.: **12/341,268**

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

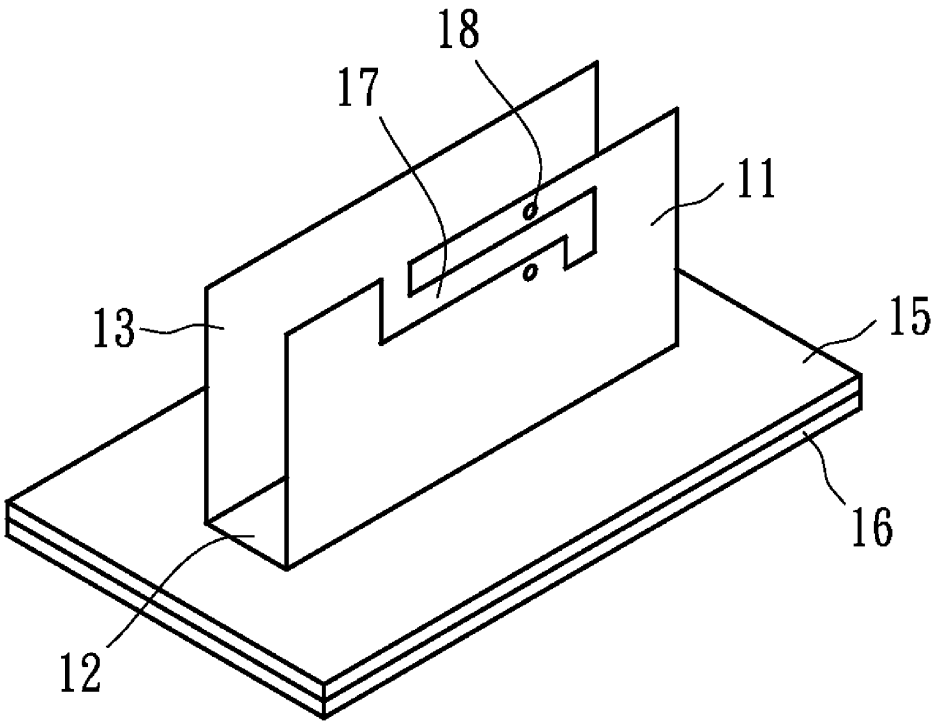
Publication Classification

(51) **Int. Cl.**
H01Q 1/52 (2006.01)
H01P 11/00 (2006.01)

(52) **U.S. Cl.** **343/841**; 29/600

(57) **ABSTRACT**

According to an embodiment of the present invention, an electromagnetic radiation apparatus includes a ground plane and an integrally formed antenna structure. The integrally formed antenna structure may include a radiation plate perpendicular to or with an angle larger than 45 degrees to the ground plane and a shielding structure configured to restrict radiation of the radiation plate.



US 20100156741A1

(19) **United States**

(12) **Patent Application Publication**

Vazquez et al.

(10) **Pub. No.: US 2010/0156741 A1**

(43) **Pub. Date: Jun. 24, 2010**

(54) **ELECTRONIC DEVICE WITH ISOLATED ANTENNAS**

(76) Inventors: **Enrique Ayala Vazquez**, Watsonville, CA (US); **Bing Chiang**, Cupertino, CA (US); **Hao Xu**, Cupertino, CA (US)

Correspondence Address:
Treyz Law Group
870 Market Street, Suite 984
SAN FRANCISCO, CA 94102 (US)

(21) Appl. No.: **12/340,610**

(22) Filed: **Dec. 19, 2008**

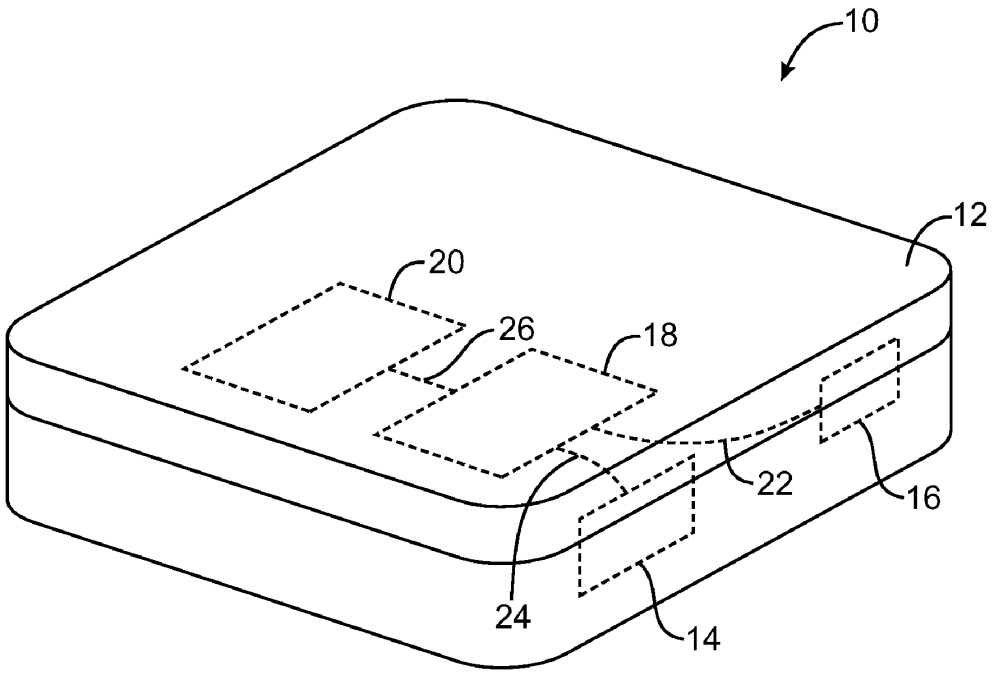
Publication Classification

(51) **Int. Cl.**
H01Q 1/48 (2006.01)
H01Q 21/00 (2006.01)

(52) **U.S. Cl.** **343/846**; 343/893; 343/702

(57) **ABSTRACT**

Antennas for electronic devices are provided. First and second antennas may be mounted within an electronic device. Free-space coupling between the first and second antennas may give rise to interference. The first and second antennas may be coupled to a global ground. The global ground may be formed using a conductive member in the electronic device such as a conductive frame member. Signals that pass between the antennas through the global ground may serve as canceling signals that reduce the magnitude of free-space interference signals and thereby improve antenna isolation. The antennas may be coupled to the global ground using electrical paths or through near-field electromagnetic coupling. Coupling efficiency to the global ground may be enhanced by configuring the conductive traces of one or both of the antennas to form a resonant circuit.



US 20100156745A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2010/0156745 A1

(43) Pub. Date: Jun. 24, 2010

ANDRENKO et al.

(54) **ANTENNA DEVICE, PRINTED CIRCUIT BOARD INCLUDING ANTENNA DEVICE, AND WIRELESS COMMUNICATION DEVICE INCLUDING ANTENNA DEVICE**

(75) Inventors: **Andrey ANDRENKO**, Kawasaki (JP); **Takashi Yamagajo**, Kawasakai (JP)

Correspondence Address:
Fujitsu Patent Center
C/O CPA Global
P.O. Box 52050
Minneapolis, MN 55402 (US)

(73) Assignee: **FUJITSU LIMITED**, Kawasaki (JP)

(21) Appl. No.: **12/645,551**

(22) Filed: **Dec. 23, 2009**

(30) **Foreign Application Priority Data**

Dec. 24, 2008 (JP) 2008-327040

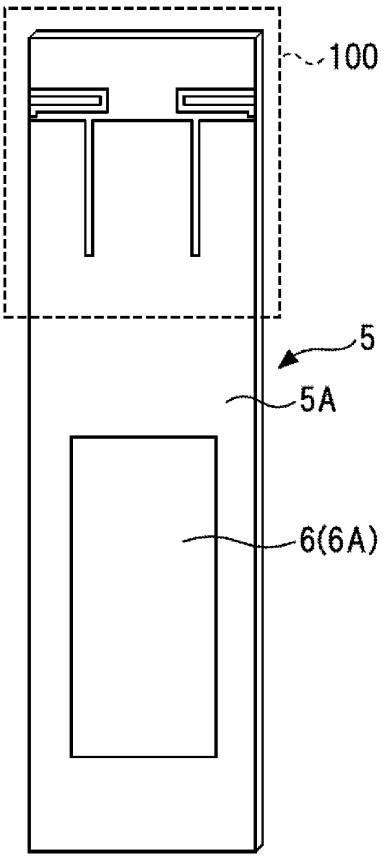
Publication Classification

(51) **Int. Cl.**
H01Q 1/48 (2006.01)
H01Q 1/38 (2006.01)

(52) **U.S. Cl.** ..... **343/848**; 343/700 MS

(57) **ABSTRACT**

An antenna device includes a substrate, a pair of antenna elements formed on a face of the substrate and which is arranged so as to be axisymmetrical with respect to a symmetrical axis, and a ground section formed on the face of the substrate on which the pair of antenna elements is formed and which is arranged proximal to the pair of antenna elements, wherein the ground section is arranged so as to be axisymmetrical with respect to the symmetrical axis, and the ground section includes a first pair of slit sections notched from an end section and extending in one direction of the symmetrical axis.



US 20100156746A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2010/0156746 A1**

(43) **Pub. Date: Jun. 24, 2010**

Yung et al.

(54) **DUAL-BAND ANTENNA**

(75) Inventors: **Huang Chih Yung**, Dongshih Township (TW); **Luo Guo Chang**, Toufen Township (TW)

Correspondence Address:
Haverstock & Owens LLP
Patent, Trademark & Copyright Attorneys
162 North Wolfe Road
Sunnyvale, CA 94086 (US)

(73) Assignee: **Arcadyan Technology Corporation**

(21) Appl. No.: **12/317,545**

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

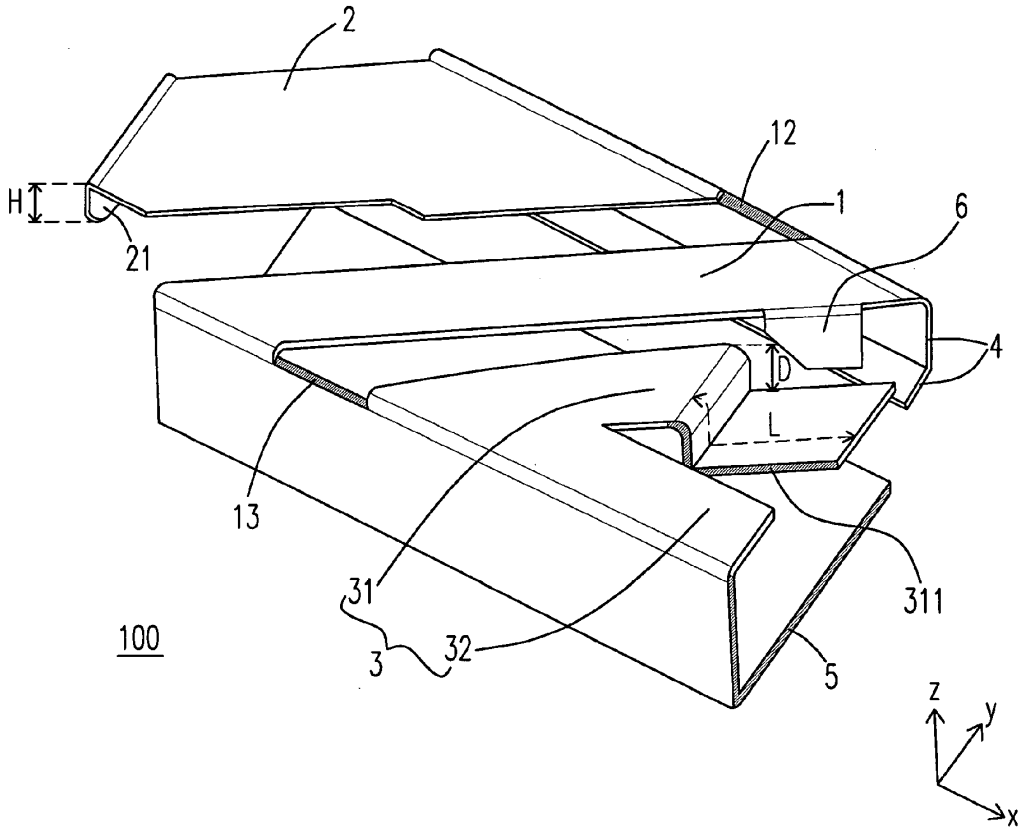
Publication Classification

(51) **Int. Cl.**
H01Q 1/50 (2006.01)
H01Q 1/38 (2006.01)

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

(57) **ABSTRACT**

The dual-band antenna is provided. The dual-band antenna includes an impedance matching control element, a first connection part, a first radiation element, a second radiation element, and a ground element. The first radiation element operates in a first frequency band, is connected to the impedance matching control element, and extends along a first direction having an obtuse angle with respect to a longitudinal direction of the first connection part. The second radiation element operates in a second frequency band. The ground element is electrically connected to the impedance matching control element and the second radiation element.



US 20100156747A1

(19) **United States**

(12) **Patent Application Publication**

Montgomery

(10) **Pub. No.: US 2010/0156747 A1**

(43) **Pub. Date: Jun. 24, 2010**

(54) **MULTI-PORT ANTENNA**

(75) Inventor: **Mark T. Montgomery**, Melbourne Beach, FL (US)

Correspondence Address:
FOLEY HOAG, LLP
PATENT GROUP, WORLD TRADE CENTER WEST
155 SEAPORT BLVD
BOSTON, MA 02110 (US)

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

(21) Appl. No.: **12/644,691**

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

Related U.S. Application Data

(60) Provisional application No. 61/140,370, filed on Dec. 23, 2008.

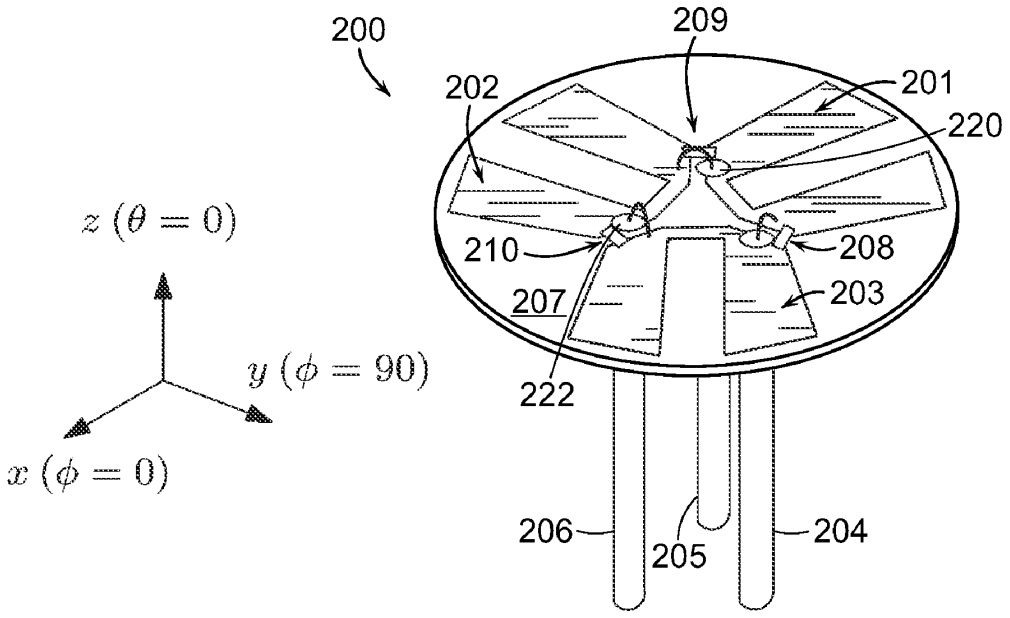
Publication Classification

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

(52) **U.S. Cl.** **343/860**; 343/893

(57) **ABSTRACT**

A multi-port antenna structure includes a plurality of electrically conductive elements arranged generally symmetrically about a central axis with a gap between adjacent electrically conductive elements. Each of the electrically conductive elements has opposite ends and a bent middle portion therebetween, with the bent middle portion being closer to the central axis than the opposite ends. Each of the electrically conductive elements is configured to have an electrical length selected to provide generally optimal operation within one or more selected frequency ranges. Each of a plurality of antenna ports is connected to adjacent electrically conductive elements across the gap therebetween such that each antenna port is generally electrically isolated from another antenna port at a given desired signal frequency range and the antenna structure generates diverse antenna patterns.



US 20100156748A1

(19) **United States**

(12) **Patent Application Publication**

HWANG et al.

(10) **Pub. No.: US 2010/0156748 A1**

(43) **Pub. Date: Jun. 24, 2010**

(54) **ANTENNA APPARATUS FOR INTERNAL IMPEDANCE MATCHING**

(75) Inventors: **Soon Ho HWANG**, Seoul (KR); **Joon Ho Byun**, Yongin-si (KR); **Tae Sik Yang**, Suwon-si (KR); **Sung Koo Park**, Suwon-si (KR); **Austin Kim**, Seongnam-si (KR); **Kyung Kyun Kang**, Suwon-si (KR)

Correspondence Address:
THE FARRELL LAW FIRM, LLP
290 Broadhollow Road, Suite 210E
Melville, NY 11747 (US)

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

(21) Appl. No.: **12/647,128**

(22) Filed: **Dec. 24, 2009**

(30) **Foreign Application Priority Data**

Dec. 24, 2008 (KR) 10-2008-0132997

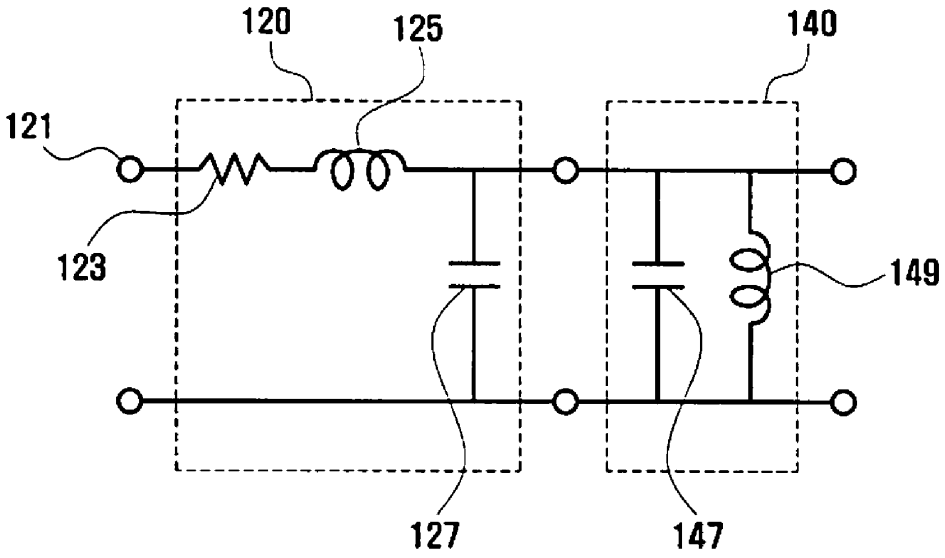
Publication Classification

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

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

(57) **ABSTRACT**

An antenna apparatus allows for internal impedance matching by employing an internal matching device therein. The antenna apparatus includes a board body formed of a dielectric material and having a flat structure. The antenna apparatus also includes an antenna device disposed on an upper surface of the board body, and the internal matching device disposed on a lower surface of the board body. The antenna device extends from a feed point and has a first impedance. The internal matching device is connected to the antenna device and has a second impedance used for matching the first impedance with a reference impedance. The antenna device and the internal matching device resonate at the reference impedance in a specific frequency band when a voltage is supplied through the feed point.



US 20100156753A1

(19) **United States**

(12) **Patent Application Publication**

Huang et al.

(10) **Pub. No.: US 2010/0156753 A1**

(43) **Pub. Date: Jun. 24, 2010**

(54) **MULTI-FREQUENCY ANTENNA**

(76) Inventors: **Jiunn-Ming Huang**, Taipei Hsien (TW); **Feng-Chi Eddie Tsai**, Taipei Hsien (TW); **Pi-Hsi Cheng**, Taipei Hsien (TW); **Hen-An Chen**, Taipei Hsien (TW); **Yu-Chuan Su**, Taipei Hsien (TW)

Correspondence Address:
BACON & THOMAS, PLLC
625 SLATERS LANE, FOURTH FLOOR
ALEXANDRIA, VA 22314-1176 (US)

(21) Appl. No.: **12/718,075**

(22) Filed: **Mar. 5, 2010**

Related U.S. Application Data

(62) Division of application No. 11/826,240, filed on Jul. 13, 2007.

(30) **Foreign Application Priority Data**

Mar. 20, 2007 (TW) 096109589

Publication Classification

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

(52) **U.S. Cl.** **343/895**

(57) **ABSTRACT**

A portable electronic device with function of receiving and radiating radio frequency (RF) signal and a multi-frequency antenna thereof are disclosed. The portable electronic device comprises a RF module and a multi-frequency antenna connecting to the RF module. The multi-frequency antenna comprises a helix element and a coaxial cable disposed within the helix element. The helix element comprises a first helix portion and a second helix portion adjacent to each other, and the coaxial cable comprises a grounding portion and a radiating portion. The first helix portion covers the grounding portion, and the radiating portion is disposed within the second helix portion separated with each other.