



US 20090295643A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0295643 A1**

(43) **Pub. Date: Dec. 3, 2009**

(54) **MULTIPLE FEEDPOINT ANTENNA**

(52) **U.S. CL.** **343/700 MS; 29/600**

(76) Inventors: **Richard Barry Angell**, Nevada
City, CA (US); **Nelson Young**,
Browns Valley, CA (US)

(57) **ABSTRACT**

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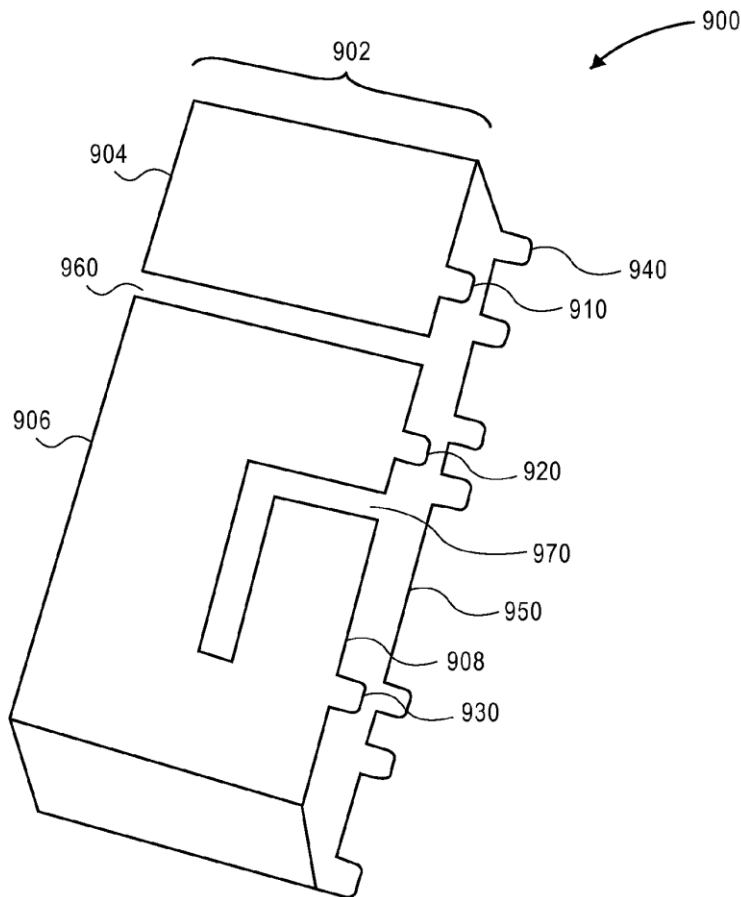
An antenna unit includes one or more antenna circuits coupled to one or more antenna structures. Each antenna structure includes a first feed point and a second feed point to receive signals from a transceiver unit or transmit signals to the transceiver unit. The first feed point of each antenna structure is configured to maximize coupling into an associated antenna structure at a first frequency band and the second feed point of each antenna structure is configured to maximize coupling into an associated antenna structure at a second frequency band. Each antenna structure has a slot that separates each antenna structure into a first patch associated with the first feed point and the first frequency band and a second patch associated with the second feed point and the second frequency band. Each antenna circuit is operatively coupled to the transceiver unit without an intervening multiplexing functionality or circuitry.

(21) Appl. No.: **12/131,724**

(22) Filed: **Jun. 2, 2008**

Publication Classification

(51) **Int. Cl.**
H01Q 9/04 (2006.01)
H01P 11/00 (2006.01)
H01Q 5/00 (2006.01)





US 20090295645A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0295645 A1**

(43) **Pub. Date: Dec. 3, 2009**

(54) **BROADBAND ANTENNA WITH MULTIPLE ASSOCIATED PATCHES AND COPLANAR GROUNDING FOR RFID APPLICATIONS**

(60) Provisional application No. 60/978,389, filed on Oct. 8, 2007, provisional application No. 61/059,665, filed on Jun. 6, 2008.

(76) Inventors: **Richard John Campero**, San Clemente, CA (US); **Bing Jiang**, San Diego, CA (US); **Steve Edward Trivelpiece**, Irvine, CA (US)

Publication Classification

(51) **Int. Cl.**
H01Q 1/38 (2006.01)
(52) **U.S. Cl.** **343/700 MS**

Correspondence Address:
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P.O. BOX 10500
MCLEAN, VA 22102 (US)

ABSTRACT

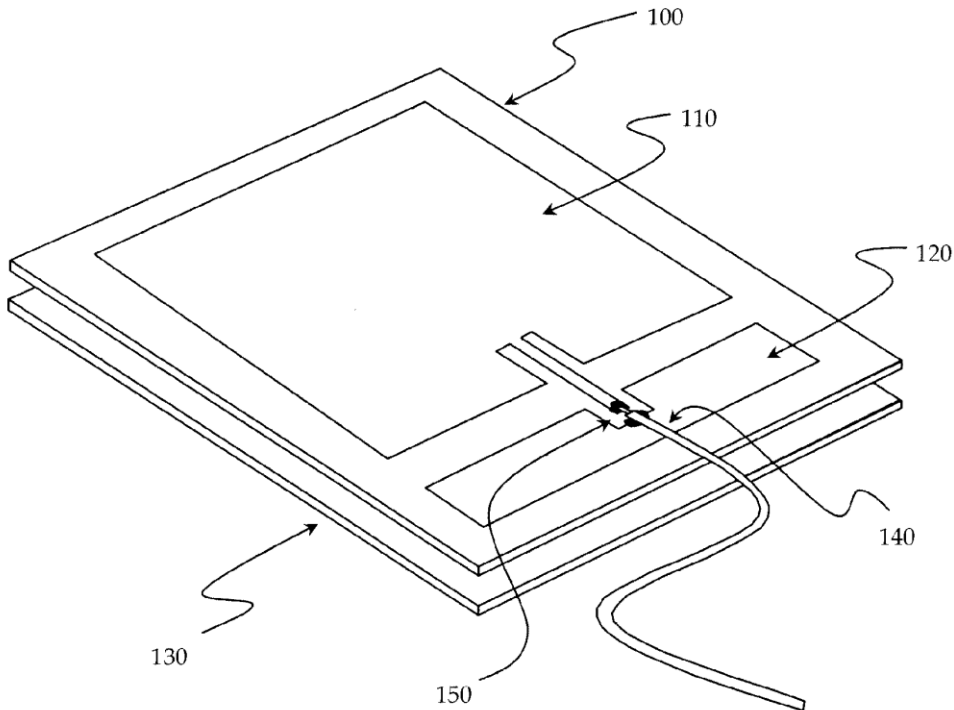
Described herein is an antenna for use with a radio frequency identification system, the antenna including a reference ground; an antenna feed; a primary patch antenna element for mid-field transmission and reception of one of HF and UHF signals, wherein the primary patch antenna element is electrically coupled to the antenna feed; and one or more additional patch antenna elements for mid-field transmission and reception of the one of HF and UHF broadband signals, wherein each of the one or more additional patch antenna elements is electrically connected to an edge of the primary patch antenna element for transmission and reception of the one of HF and UHF signals. The one or more additional patch antenna elements provide for gain enhancement of the one of HF and UHF signals.

(21) Appl. No.: **12/480,646**

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

Related U.S. Application Data

(63) Continuation-in-part of application No. 12/247,994, filed on Oct. 8, 2008.





US 20090295646A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0295646 A1**

(43) **Pub. Date: Dec. 3, 2009**

(54) **SELF-RESONATING ANTENNA**

Publication Classification

(75) Inventors: **Sung-Hoon Oh**, Plantation, FL (US); **Soo Won Hong**, Vernon Hills, IL (US); **Mattia Pascolini**, Plantation, FL (US)

(51) **Int. Cl.**
H01Q 13/10 (2006.01)
H01Q 9/04 (2006.01)
H01Q 1/24 (2006.01)

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

(57) **ABSTRACT**

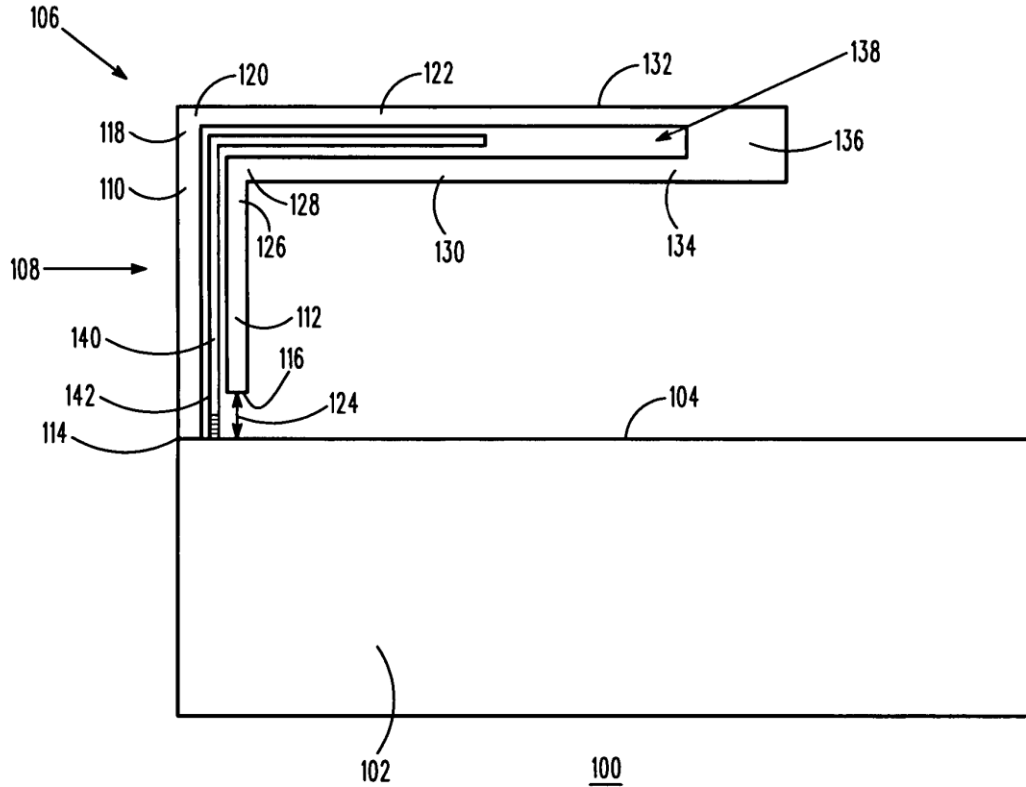
Correspondence Address:
Mayback & Hoffman, P.A.
5722 S. Flamingo Road, #232
Fort Lauderdale, FL 33330 (US)

An antenna includes a U-shaped radiator portion having a first extending arm and a second extending arm parallel and adjacent the first extending arm and coupled to the first extending arm by a junction portion, where the first and second extending arms and the junction portion defining a slot. The antenna further includes a ground plane physically coupled only to the first extending arm and a distributed feed element disposed at least partially within the slot and operable to radiate electromagnetic signals within a first frequency range and electrically excite at least portions of the radiator portion at at least a second frequency range having frequencies outside the first frequency range, thereby causing the radiator portion to radiate electromagnetic signals within the second frequency range.

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

(21) Appl. No.: **12/128,681**

(22) Filed: **May 29, 2008**





US 20090295649A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0295649 A1**

(43) **Pub. Date: Dec. 3, 2009**

(54) **MOBILE COMMUNICATION TERMINAL**

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

(75) Inventors: **Chan Gwang An**, Suwon (KR); **Jae Suk Sung**, Yongin (KR); **Sung Eun Cho**, Suwon (KR); **Ha Ryong Hong**, Hwaseong (KR); **Hyun Kil Nam**, Seoul (KR); **Ki Won Chang**, Suwon (KR); **Dae Seong Jeon**, Suwon (KR)

(30) **Foreign Application Priority Data**

May 27, 2008 (KR) 10-2008-0049044

Publication Classification

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

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

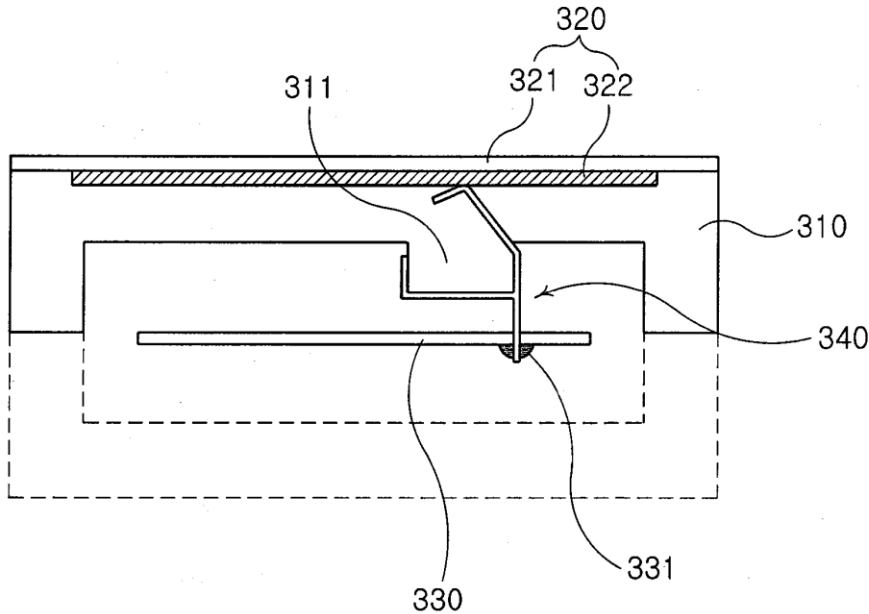
(57) **ABSTRACT**

There is provided a mobile communication terminal including: a housing of the mobile communication terminal; a film type antenna provided on the surface of the housing; a printed circuit board disposed inside the housing; and a connector electrically connecting the film type antenna and the printed circuit board.

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(73) Assignee: **Samsung Electro-Mechanics Co., Ltd.**, Suwon (KR)

(21) Appl. No.: **12/243,697**





US 20090295650A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0295650 A1**

(43) **Pub. Date: Dec. 3, 2009**

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

(30) **Foreign Application Priority Data**

May 30, 2008 (JP) 2008-142663

(75) Inventors: **Makoto HIGAKI**, Kawasaki-Shi (JP); **Kazuhiro INOUE**, Inagi-Shi (JP); **Tomohiro SUETSUNA**, Kawasaki-Shi (JP)

Publication Classification

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

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

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

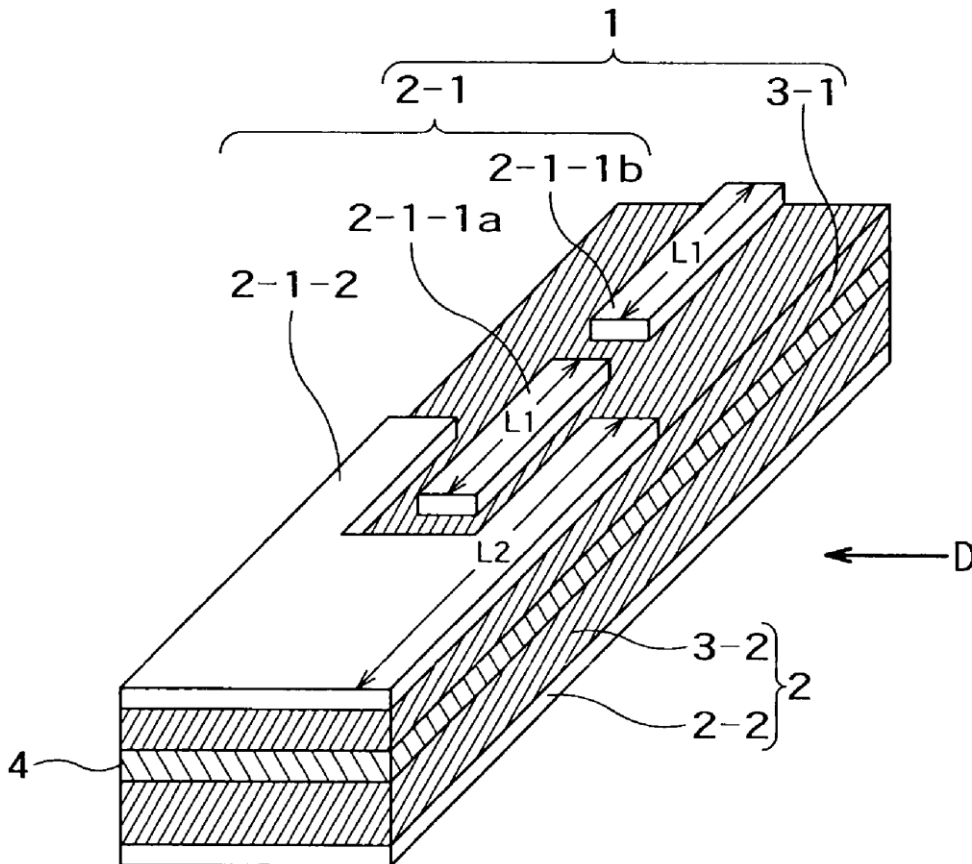
(57) **ABSTRACT**

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

An antenna device includes a first dielectric plate; a radiating element formed on a surface of the first dielectric plate; a second dielectric plate; a first conductive plate formed on a surface of the second dielectric plate; and a magnetic plate provided between a back surface of the first dielectric plate and a back surface of the second dielectric plate.

(21) Appl. No.: **12/351,235**

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





US 20090295651A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0295651 A1**

(43) **Pub. Date: Dec. 3, 2009**

(54) **INTERNAL DIVERSITY ANTENNA ARCHITECTURE**

(75) Inventors: **Weiping Dou**, Milpitas, CA (US);
Stephen Senatore, So. San Francisco, CA (US); **Arthur Zarnowitz**, San Jose, CA (US)

Correspondence Address:
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SUITE 102
WEXFORD, PA 15090 (US)

(73) Assignee: **PALM, INC.**, Sunnyvale, CA (US)

(21) Appl. No.: **12/434,434**

(22) Filed: **May 1, 2009**

Related U.S. Application Data

(63) Continuation of application No. 11/361,860, filed on Feb. 24, 2006, now Pat. No. 7,548,208.

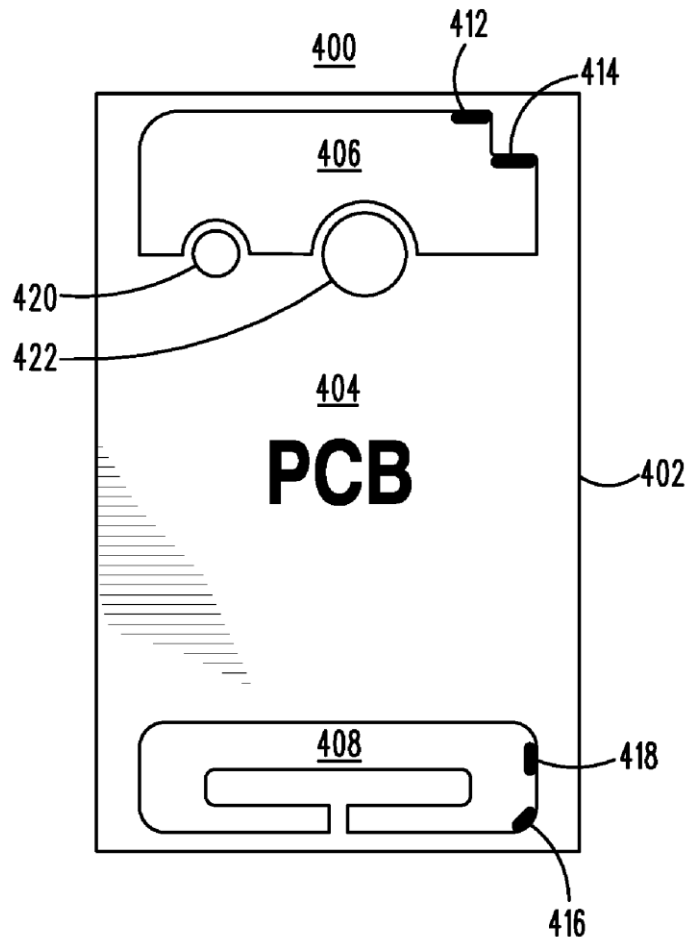
Publication Classification

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

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

(57) **ABSTRACT**

Various embodiments of an internal diversity antenna architecture are described. In one embodiment, a wireless device may include a housing enclosing a printed circuit board, a first diversity antenna, and a second diversity antenna internal to the housing. The second diversity antenna may be positioned substantially near the bottom of the housing or the bottom the printed circuit board. Other embodiments are described and claimed.





US 20090295652A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0295652 A1**

(43) **Pub. Date: Dec. 3, 2009**

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

Publication Classification

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

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

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

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

(57) **ABSTRACT**

Disclosed is a planar antenna, including: a film formed of a planar insulating material; an antenna portion which is a planar conductor on the film; and a ground portion which is a conductor to be grounded, wherein the antenna portion comprises: at least one first short stub; a first antenna element which is connected to the ground portion through the at least one first short stub and whose shape has such an angle that a distance between the first antenna element and the ground portion increases with increasing distance from a feeding point along the ground portion, the feeding point being provided between the first antenna element and the ground portion; a second short stub; and a second antenna element which is connected to the first antenna element through the second short stub.

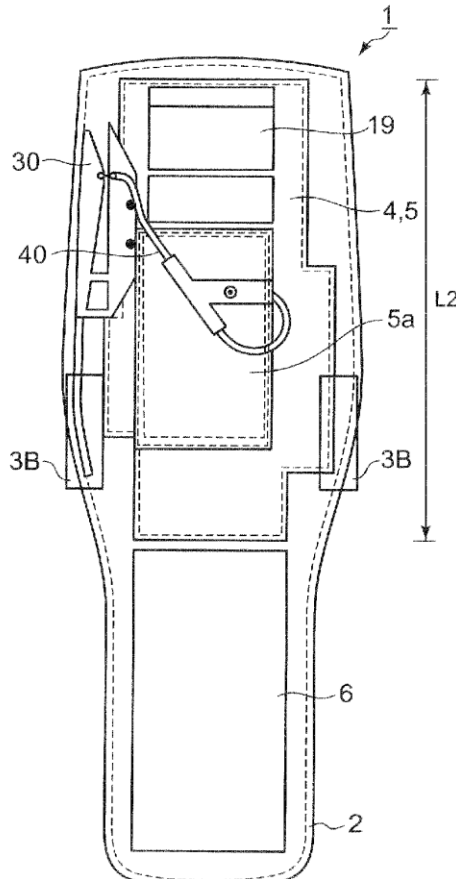
(73) Assignee: **Casio Computer Co., Ltd.**, Tokyo (JP)

(21) Appl. No.: **12/473,680**

(22) Filed: **May 28, 2009**

(30) **Foreign Application Priority Data**

May 29, 2008 (JP) 2008-140595





US 2009029563A1

(19) **United States**

(12) **Patent Application Publication**
Komura

(10) **Pub. No.: US 2009/0295653 A1**

(43) **Pub. Date: Dec. 3, 2009**

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

(30) **Foreign Application Priority Data**

Mar. 23, 2007 (JP) 2007-076659

(75) Inventor: **Ryo Komura, Kanazawa-shi (JP)**

Publication Classification

Correspondence Address:
MURATA MANUFACTURING COMPANY, LTD.
C/O KEATING & BENNETT, LLP
1800 Alexander Bell Drive, SUITE 200
Reston, VA 20191 (US)

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

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

(57) **ABSTRACT**

An antenna includes linear electrodes disposed on a surface of a substrate. A surface-mount antenna element including a capacitor is disposed in a non-ground region of a mount board. The capacitor is arranged such that portions of at least one of two linear electrodes face each other with a predetermined distance therebetween. The non-ground region includes a first radiation electrode and linear electrode portions of a second radiation electrode. The linear electrodes of the surface-mount antenna element are individually connected to the radiation electrodes. A chip reactive element is disposed at the first radiation electrode and the linear electrode portions of the second radiation electrode as appropriate.

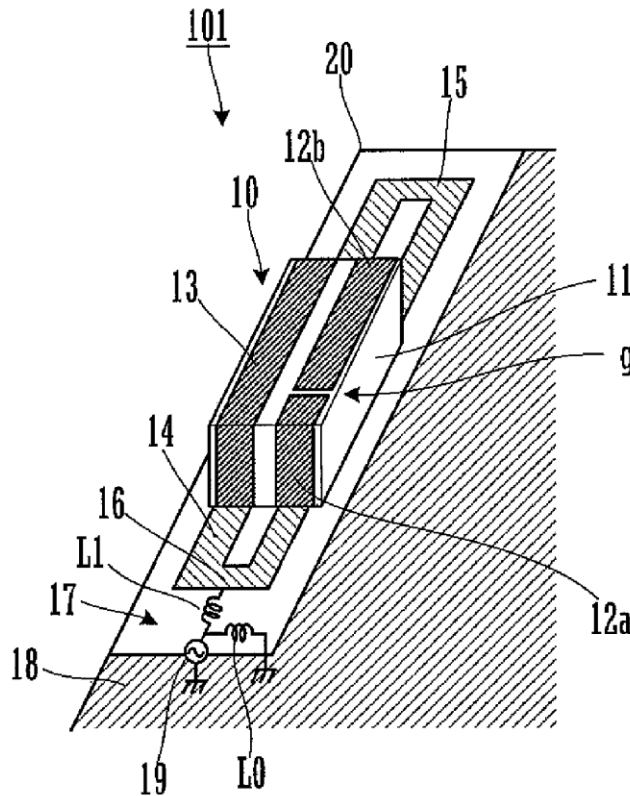
(73) Assignee: **MURATA MANUFACTURING CO., LTD., Nagaokakyo-shi (JP)**

(21) Appl. No.: **12/542,731**

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

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2008/051506, filed on Jan. 31, 2008.





US 20090295655A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0295655 A1**

(43) **Pub. Date: Dec. 3, 2009**

(54) **PLANAR ANTENNA, COMMUNICATION APPARATUS AND MOUNTING METHOD OF PLANAR ANTENNA**

(30) **Foreign Application Priority Data**

May 28, 2008 (JP) 2008-139522

Publication Classification

(75) Inventors: **Kiyokazu Akiyama**, Okazaki-city (JP); **Yuji Sugimoto**, Kariya-city (JP); **Taizo Mizutani**, Nagoya-city (JP); **Michio Shamoto**, Konan-city (JP)

(51) **Int. Cl.**
H01Q 9/04 (2006.01)
H01Q 19/00 (2006.01)
H01Q 1/32 (2006.01)

(52) **U.S. Cl.** **343/713; 343/833; 343/700 MS**

(57) **ABSTRACT**

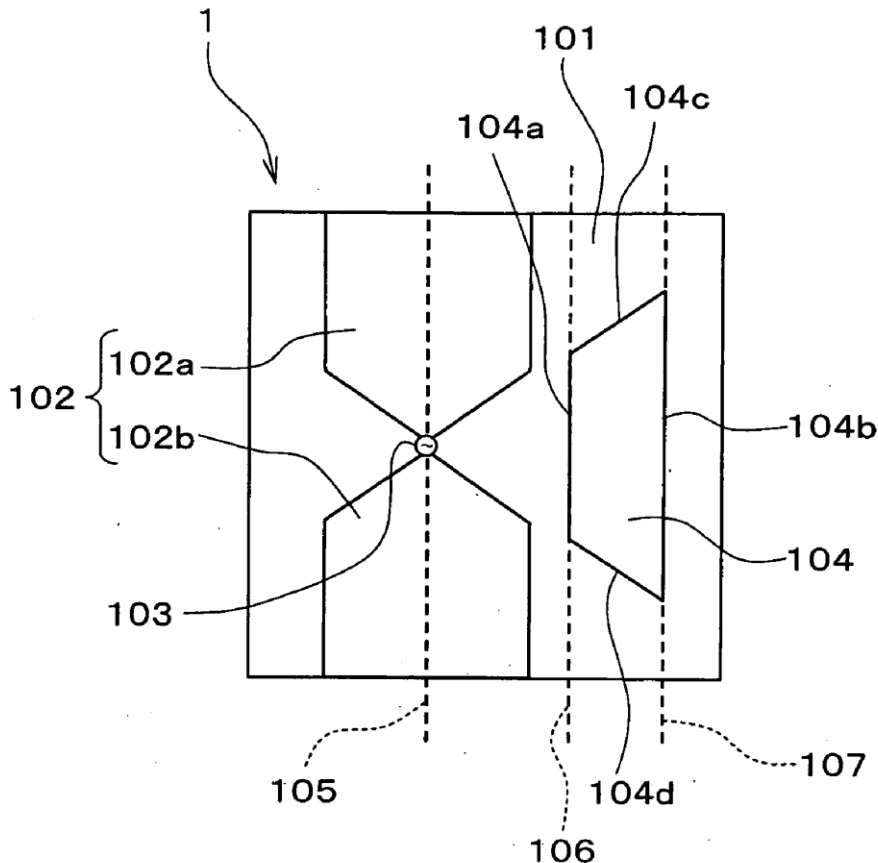
Correspondence Address:
HARNES, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303 (US)

A planar antenna is disclosed. The planar antenna includes: a radiator element having a wideband resonant characteristic; and a parasitic element having a planar shape. The parasitic element has a first side, a second side, a third side and a fourth side. Each of the first side and the second side is parallel to a direction of an electric current to be excited in the radiator element. The first side is located closer to the radiator element than the second side is. The first side is shorter than the second side. The third side connects one ends of the first side and the second side. The fourth side connects the other ends of the first side and the second side. A region between the third and fourth sides tapers in a direction from the second side toward the first side.

(73) Assignees: **DENSO CORPORATION**, Kariya-city (JP); **Nippon Soken, Inc.**, Nishio-city (JP)

(21) Appl. No.: **12/454,419**

(22) Filed: **May 18, 2009**





US 20090295658A1

(19) **United States**

(12) **Patent Application Publication**
Xi

(10) **Pub. No.: US 2009/0295658 A1**

(43) **Pub. Date: Dec. 3, 2009**

(54) **LOOP ANTENNA DEVICE WITH LARGE OPENING AREA**

Publication Classification

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

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

(57) **ABSTRACT**

(76) Inventor: **Li Xi, Miyagi-ken (JP)**

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CHICAGO, IL 60610 (US)

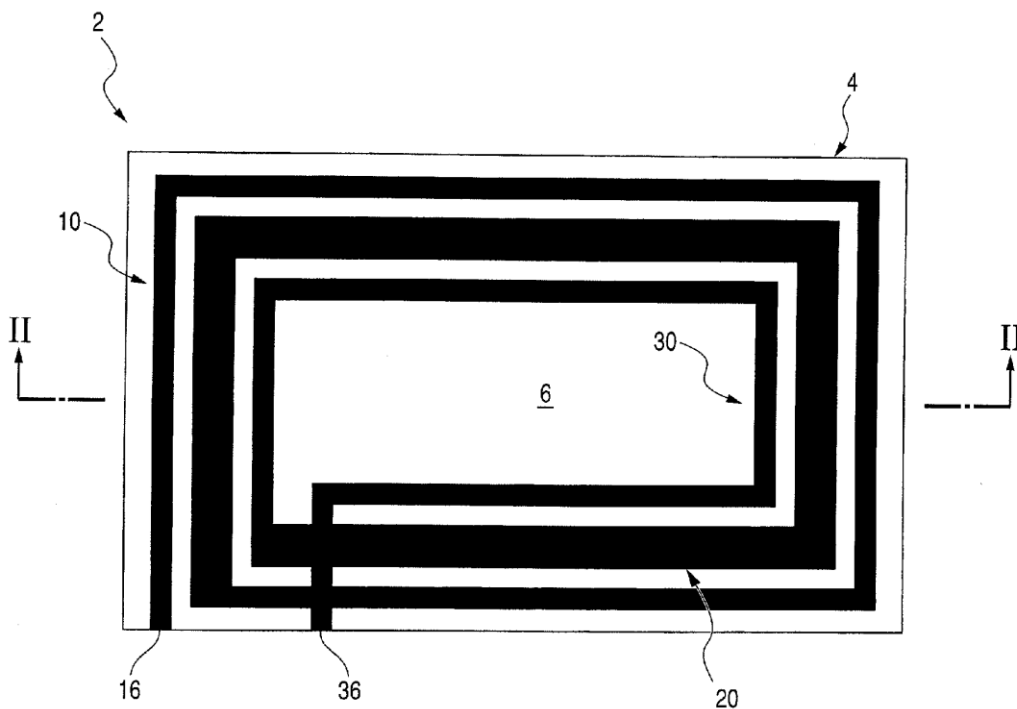
A loop antenna device is disclosed with an increased number of turns, a large opening area, and a high Q value. The loop antenna device includes: a conductor wound spirally on an insulating substrate, wherein the conductor is constituted by a plurality of loops which are connected and each of which has a substantially rectangular shape with predetermined height and width in a cross-sectional view, and with regard to the adjacent loops of which height portions face each other, a height of the one loop is smaller than a height of the other loop, and a width of the other loop is smaller than a width of the one loop.

(21) Appl. No.: **12/473,641**

(22) Filed: **May 28, 2009**

(30) **Foreign Application Priority Data**

Jun. 2, 2008 (JP) 2008-144182





US 20090295662A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0295662 A1**

(43) **Pub. Date: Dec. 3, 2009**

(54) **ANTENNA DEVICE**

Publication Classification

(75) Inventors: **Tomohiro Suetsuna**, Kanagawa (JP); **Makoto Higaki**, Kanagawa (JP); **Kouichi Harada**, Tokyo (JP); **Seiichi Suenaga**, Kanagawa (JP); **Mitsuru Ishibashi**, Kanagawa (JP); **Maki Yonetsu**, Tokyo (JP)

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

(52) **U.S. Cl.** **343/787; 343/848**

Correspondence Address:

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

(57) **ABSTRACT**

The present invention provides a small antenna device realizing both miniaturization including lower profile and a broader band in a frequency band of hundreds MHz to 5 GHz and which can be mounted on a small device such as a cellular phone. An antenna device includes: a finite ground plane; a rectangular conductor plate provided above the finite ground plane, whose one side is connected to the finite ground plane, and having a bent portion substantially parallel with the one side; an antenna disposed substantially parallel with the finite ground plane above the finite ground plane, extending in a direction substantially perpendicular to the one side, and having a feeding point positioned near the other side facing the one side of the rectangular conductor plate; and a magnetic material provided in at least a part of space between the finite ground plane and the antenna.

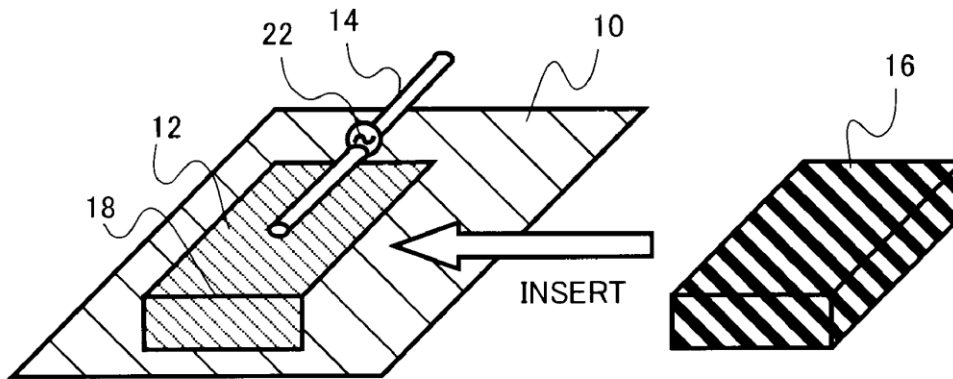
(73) Assignee: **KABUSHIKI KAISHA TOSHIBA**, Tokyo (JP)

(21) Appl. No.: **12/410,768**

(22) Filed: **Mar. 25, 2009**

(30) **Foreign Application Priority Data**

May 30, 2008 (JP) 2008-141856





US 20090295667A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0295667 A1**

(43) **Pub. Date: Dec. 3, 2009**

(54) **ULTRA HIGH FREQUENCY PLANAR ANTENNA**

(30) **Foreign Application Priority Data**

May 30, 2008 (TW) 097120197

(75) Inventors: **Tzyh-guang Ma**, Taipei (TW);
Ren-ching Hua, Taipei (TW);
Jyh-woei Tsai, Taipei (TW)

Publication Classification

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

(52) **U.S. Cl.** **343/795; 343/818**

(57) **ABSTRACT**

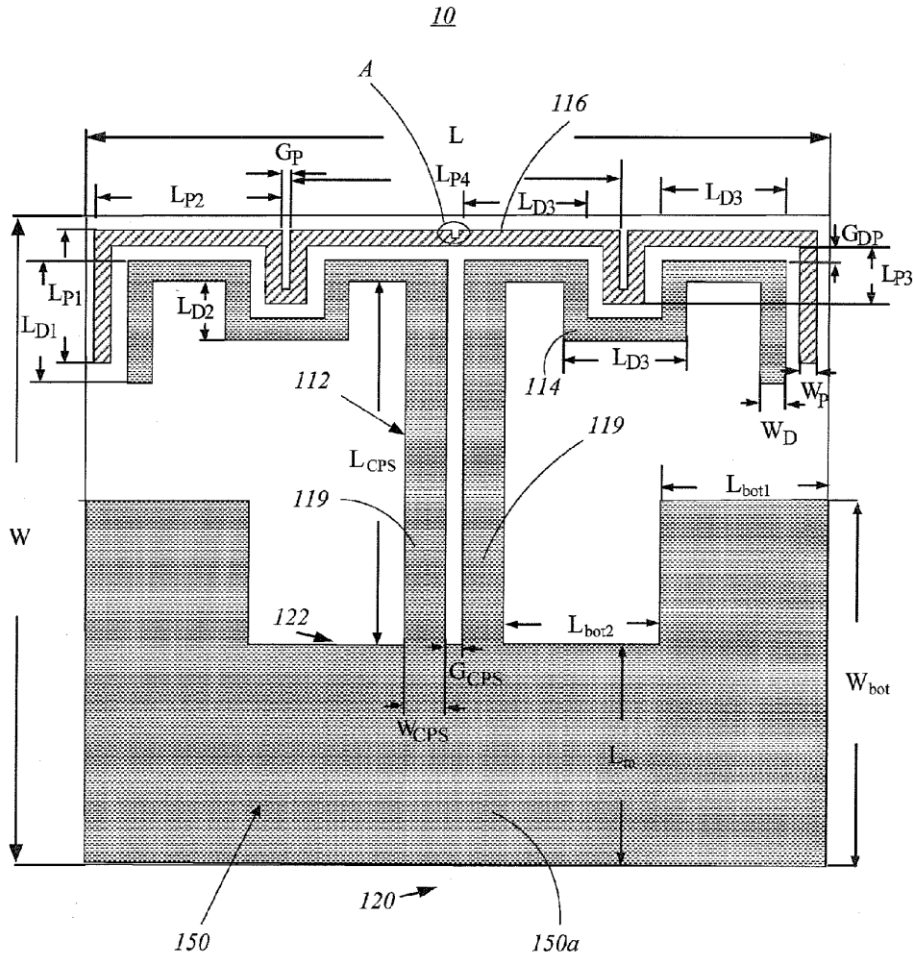
Correspondence Address:
KIRTON AND MCCONKIE
60 EAST SOUTH TEMPLE., SUITE 1800
SALT LAKE CITY, UT 84111 (US)

An ultra high frequency antenna includes a first plane, a second plane opposite to the first plane by a distance, a driven dipole, at least a parasitic element having an indentation, and a balun. The balun includes a coplanar strip line and a microstrip line which has a first strip, a second strip area parallel to the first strip, and a third strip perpendicular to the first and second strips. The coplanar strip line coupled to a truncated ground plane with two narrow slots. The present planer antenna features a compact size, wide impedance bandwidth, moderate gain, and excellent front-to-back ratio. This antenna is well suitable for the applications in RFID handheld readers.

(73) Assignee: **National Taiwan University of Science and Technology**, Taipei (TW)

(21) Appl. No.: **12/325,366**

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





US 20090295670A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0295670 A1**

(43) **Pub. Date: Dec. 3, 2009**

(54) **FLAT ANTENNA AND ANTENNA DEVICE**

(30) **Foreign Application Priority Data**

(75) Inventors: **Feng-Chi Eddie Tsai**, Taipei Hsien (TW); **Yu-Chuan Su**, Taipei Hsien (TW); **Chin-Lung Yeh**, Taipei Hsien (TW); **Yin-Ping Wu**, Taipei Hsien (TW)

Jun. 2, 2008 (TW) 097120443

Publication Classification

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

(52) **U.S. Cl.** **343/850; 333/167**

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

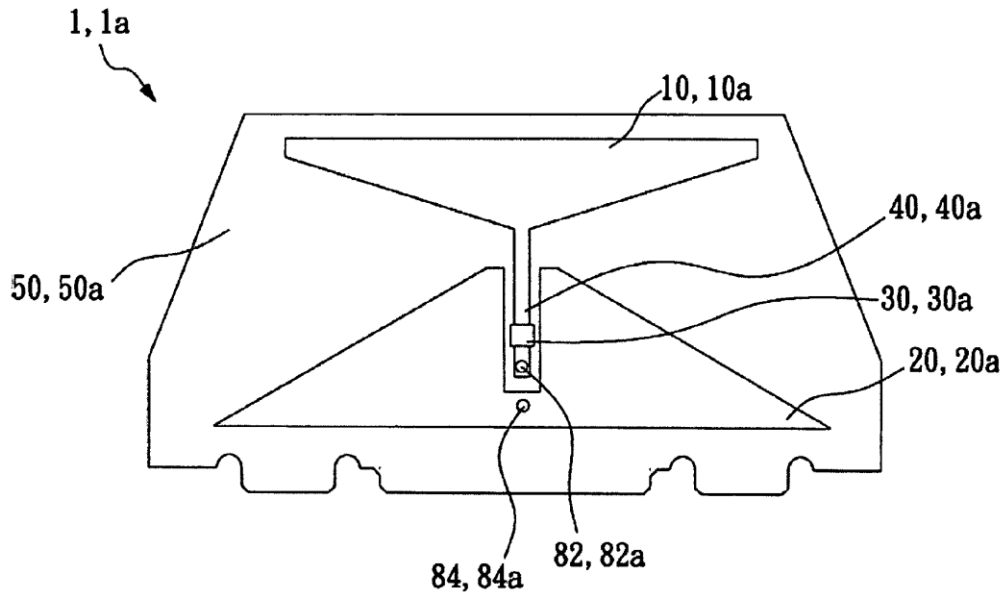
(57) **ABSTRACT**

A flat antenna is used for a cable inputting a signal. The flat antenna comprises a base board, a radiator element, a filter unit, and a ground element wherein the radiator element, the filter unit, and the ground element are disposed on the board. The filter unit is used for eliminating or keeping the specific range of the frequency.

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

(21) Appl. No.: **12/379,128**

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





US 20090295675A1

(19) **United States**

(12) **Patent Application Publication**
Tang

(10) **Pub. No.: US 2009/0295675 A1**

(43) **Pub. Date: Dec. 3, 2009**

(54) **IC PACKAGE ANTENNA**

Publication Classification

(76) Inventor: **Chia-Lun Tang**, Pa-Te City (TW)

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

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

Correspondence Address:
ROSENBERG, KLEIN & LEE
3458 ELLICOTT CENTER DRIVE-SUITE 101
ELLICOTT CITY, MD 21043 (US)

(57) **ABSTRACT**

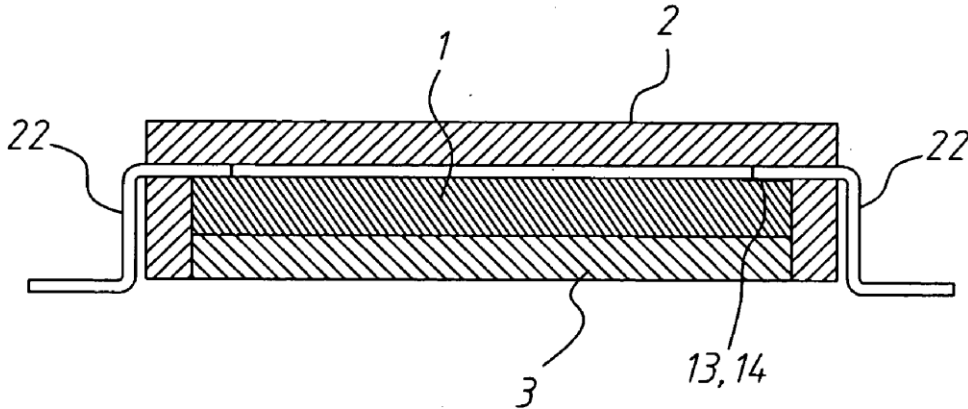
An IC package antenna of which a metal radiating member is firstly provided on a board to form an antenna base board; the board is formed thereon at least a feed point; and the IC package antenna is packaged with an IC packaging housing and a packaging bottom portion to form an IC chip. The IC packaging housing has a plurality of connecting pins extending outward from inside of itself; wherein the inner end of at least one connecting pin is soldering connected with a feed point of the base board of the antenna. Such an IC package antenna can allow standardized and miniaturized antenna designing, and is applicable to Surface Mount Technology (SMT).

(21) Appl. No.: **12/285,388**

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

Related U.S. Application Data

(63) Continuation-in-part of application No. 12/127,041, filed on May 27, 2008, now Pat. No. 7,595,731.





US 20090303131A1

(19) **United States**

(12) **Patent Application Publication**
Schano

(10) **Pub. No.: US 2009/0303131 A1**

(43) **Pub. Date: Dec. 10, 2009**

(54) **MULTIBAND OMNIDIRECTIONAL ANTENNA**

(30) **Foreign Application Priority Data**

Nov. 21, 2005 (DE) 10 2005 055 345.1

(76) Inventor: **Thomas Schano, Giesen (DE)**

Publication Classification

Correspondence Address:
KENYON & KENYON LLP
ONE BROADWAY
NEW YORK, NY 10004 (US)

(51) **Int. Cl.**
H01Q 1/38 (2006.01)
H01Q 5/00 (2006.01)

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

(57) **ABSTRACT**

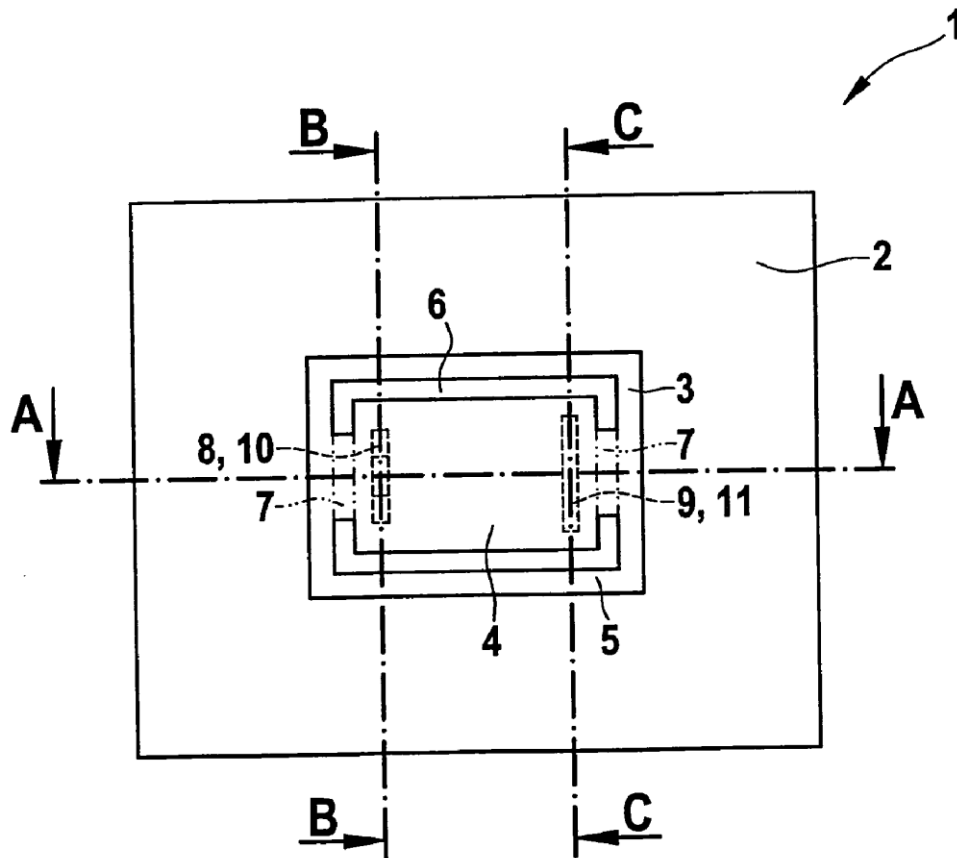
(21) Appl. No.: **12/084,936**

A multiband omnidirectional antenna which includes a grounded face and an antenna element situated parallel to the grounded face, the antenna element having a first planar emitter, which has a planar design and extends parallel to the grounded face, a second planar emitter, which surrounds the first planar emitter at a distance, and at least two connection elements for connecting the first and the second planar emitters to each other.

(22) PCT Filed: **Oct. 31, 2006**

(86) PCT No.: **PCT/EP2006/067981**

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





US 20090303132A1

(19) **United States**

(12) **Patent Application Publication**
Smith

(10) **Pub. No.: US 2009/0303132 A1**

(43) **Pub. Date: Dec. 10, 2009**

(54) **PLANAR ANTENNAS AND BANDWIDTH
EXTENSION APERTURES**

Publication Classification

(75) Inventor: **James P. Smith, Mesa, AZ (US)**

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

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

Correspondence Address:
GARRETT IP, LLC
C/O CPA Global, P.O. BOX 52050
MINNEAPOLIS, MN 55402 (US)

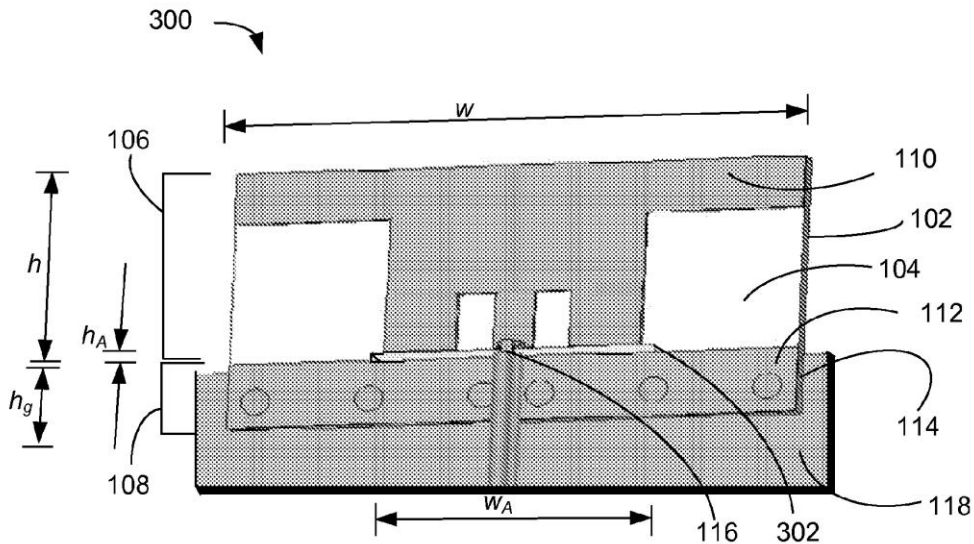
(57) **ABSTRACT**

(73) Assignee: **Intel Corporation, Santa Clara, CA (US)**

Methods and systems to implement planar antennas and bandwidth extension apertures, including planar antennas etched in metal clad printed circuit board materials, relatively small-scale planar antennas having dimensions in a range of centimeters and/or millimeters, planar antennas to operate in GHz frequency ranges, and bandwidth extension apertures to alter an antenna impedance, reduce an antenna return loss, reduce an antenna Q factor, and/or increase an antenna frequency bandwidth.

(21) Appl. No.: **12/133,749**

(22) Filed: **Jun. 5, 2008**





US 20090303133A1

(19) **United States**

(12) **Patent Application Publication**
Ueki

(10) **Pub. No.: US 2009/0303133 A1**

(43) **Pub. Date: Dec. 10, 2009**

(54) **ANTENNA AND COMMUNICATION DEVICE
HAVING THE SAME**

Publication Classification

(76) Inventor: **Noriyuki Ueki**, Tokyo-to (JP)

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

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

Correspondence Address:
MURATA MANUFACTURING COMPANY, LTD.
C/O KEATING & BENNETT, LLP
1800 Alexander Bell Drive, SUITE 200
Reston, VA 20191 (US)

(57) **ABSTRACT**

(21) Appl. No.: **12/482,742**

A plate-like radiation element is arranged above a ground plane with a space from the ground plane. The radiation element 2 resonates at a predetermined low-frequency wavelength λ_1 and a predetermined high-frequency wavelength λ_2 . A feeding portion for being connected to a feed circuit and a pair of short-circuit portions are provided on peripheral edge portions of the radiation element. The feeding portion is provided on one end of the radiation element. The pair of short-circuit portions for being connected to a ground plane are arranged in areas positioned at opposite sides, on both sides of the feeding portion along peripheral edge directions of the radiation element, where the voltages of high-frequency resonance supplied from the feeding portion to the individual short-circuit portions are zero. The short-circuit portions extend toward the ground plane for being connected to the ground plane. At the other end opposite to the feeding portion of the radiation element is an open end. An electrical length from the one end side to the open end of the radiation element is set to one-half of the high-frequency resonant wavelength λ_2 of the radiation element.

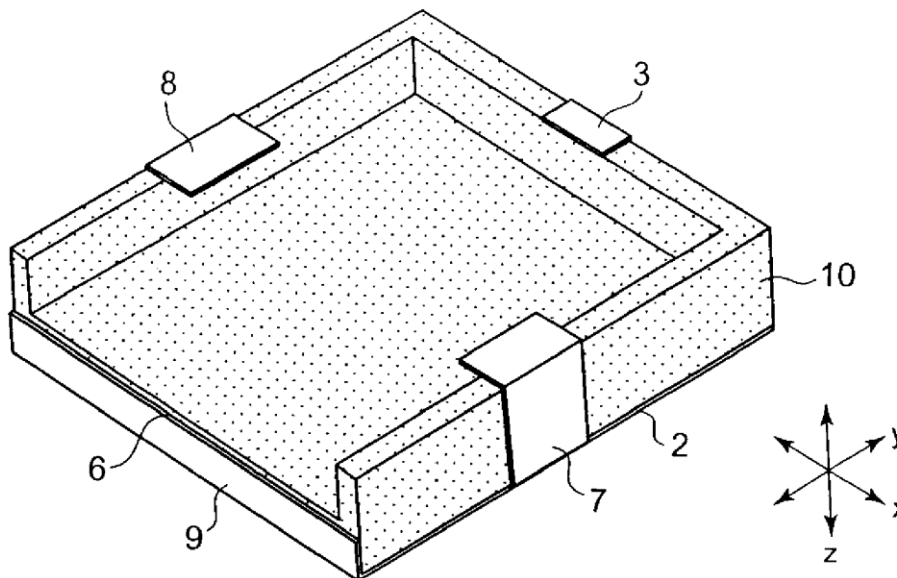
(22) Filed: **Jun. 11, 2009**

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2007/069374, filed on Oct. 3, 2007.

Foreign Application Priority Data

(30) Dec. 15, 2006 (JP) JP2006-338654





US 20090303134A1

(19) **United States**

(12) **Patent Application Publication**
PUENTE BALIARDA et al.

(10) **Pub. No.: US 2009/0303134 A1**

(43) **Pub. Date: Dec. 10, 2009**

(54) **SPACE-FILLING MINIATURE ANTENNAS**

(75) Inventors: **CARLES PUENTE BALIARDA**,
Tiana (ES); **EDOUARD JEAN**
LOUIS ROZAN, BARCELONA
(ES); **JAIME ANGUERA PROS**,
VINAROS (ES)

No. 11/686,804, filed on Mar. 15, 2007, now Pat. No. 7,554,490, which is a division of application No. 11/179,250, filed on Jul. 12, 2005, now Pat. No. 7,202,822, which is a continuation of application No. 11/110,052, filed on Apr. 20, 2005, now Pat. No. 7,148,850, which is a continuation of application No. 10/182,635, filed on Nov. 1, 2002, now abandoned, filed as application No. PCT/EP00/00411 on Jan. 19, 2000.

Correspondence Address:
HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS, TX 75374-1715 (US)

Publication Classification

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

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

(73) Assignee: **FRACTUS, S.A.**, BARCELONA
(ES)

(57) **ABSTRACT**

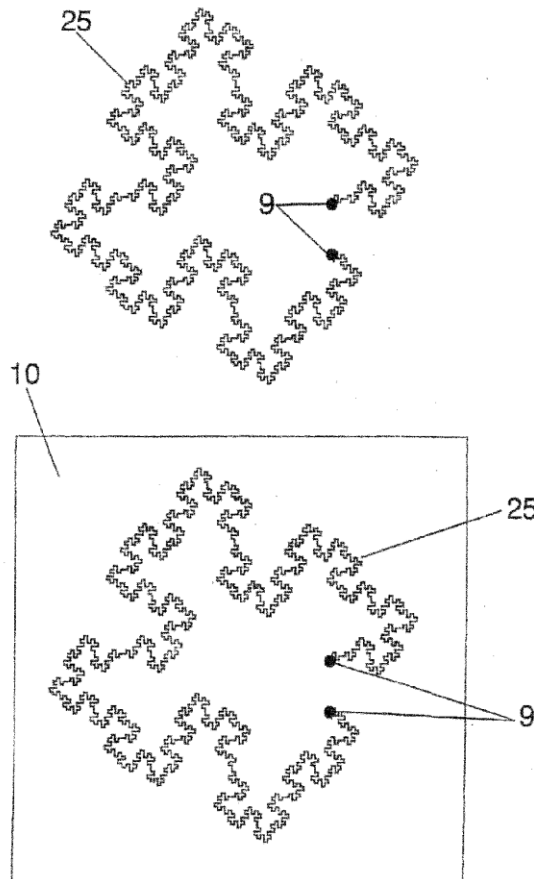
(21) Appl. No.: **12/498,090**

A novel geometry, the geometry of Space-Filling Curves (SFC) is defined in the present invention and it is used to shape a part of an antenna. By means of this novel technique, the size of the antenna can be reduced with respect to prior art, or alternatively, given a fixed size the antenna can operate at a lower frequency with respect to a conventional antenna of the same size.

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

Related U.S. Application Data

(60) Continuation of application No. 12/347,462, filed on Dec. 31, 2008, which is a continuation of application





US 20090303136A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0303136 A1**

(43) **Pub. Date: Dec. 10, 2009**

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

Publication Classification

(76) Inventors: **Akio Kuramoto**, Tokyo (JP);
Takuji Mochizuki, Kanagawa (JP)

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

(52) **U.S. Cl.** **343/702; 343/700 MS; 343/791**

Correspondence Address:
Mr. Jackson Chen
6535 N. STATE HWY 161
IRVING, TX 75039 (US)

(57) **ABSTRACT**

An antenna device which is very compact, low in profile, wide in bandwidth, simple in configuration and inexpensive is provided. A plate type wideband antenna device according to the present invention is formed with a radiation element which is formed by bending a tapered conductor plate **11** into a rough squared U shape, a conductor **12** which serves as a ground plate and a coaxial cable **1** which feeds power, and is configured by connecting the coaxial center conductor **2** of the coaxial cable to the tapered conductor **11** of a squared U shape and connecting the coaxial external conductor **3** to the ground plate **12**. By this, a very small antenna device whose entire size is **0.2** wavelengths long, **0.1** wavelengths wide and **0.1** wavelengths high relative to the frequency used is obtained.

(21) Appl. No.: **12/278,823**

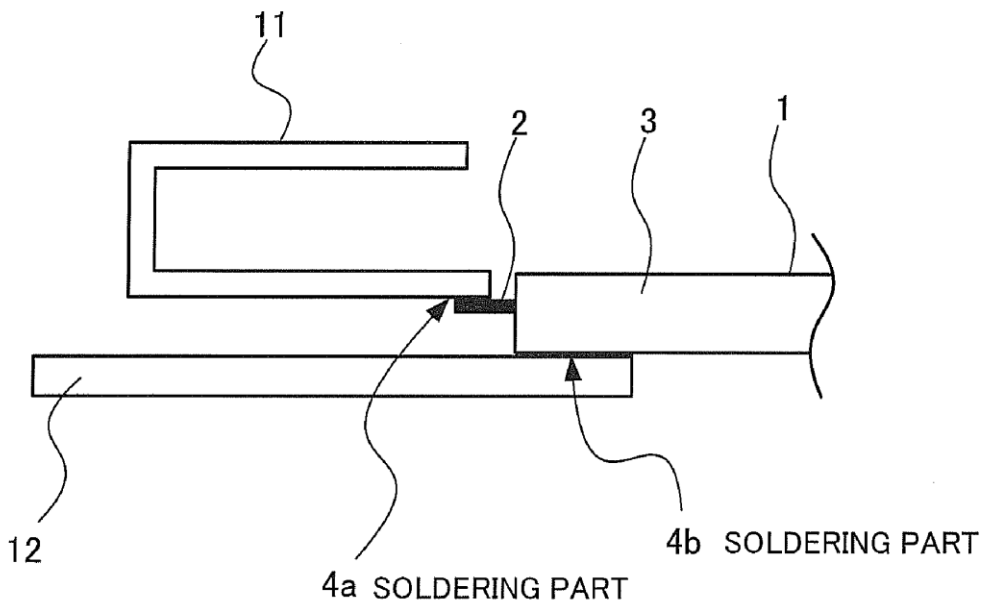
(22) PCT Filed: **Jan. 31, 2007**

(86) PCT No.: **PCT/JP2007/052076**

§ 371 (c)(1),
(2), (4) Date: **Aug. 8, 2008**

(30) **Foreign Application Priority Data**

Feb. 8, 2006 (JP) 2006-030400





US 20090303140A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0303140 A1**

(43) **Pub. Date: Dec. 10, 2009**

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

(30) **Foreign Application Priority Data**

Apr. 5, 2007 (JP) 2007-099579

(75) Inventors: **Jin SATO**, Beijing (CN); **Yuji KAMINISHI**, Ishikawa-gun (JP)

Publication Classification

Correspondence Address:
MURATA MANUFACTURING COMPANY, LTD.
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1800 Alexander Bell Drive, SUITE 200
Reston, VA 20191 (US)

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

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

(57) **ABSTRACT**

In an antenna, a first type radiation electrode and a second type radiation electrode are provided on the surface of a dielectric base, which has a predetermined external shape, or embedded in the dielectric base. The first type radiation electrode is provided with an open terminal at one end thereof and a feeding terminal at the other end thereof so as to constitute a monopole type antenna. The second type radiation electrode is provided with a capacitive-coupling feeding electrode at one end thereof and a ground connection terminal at the other end thereof so as to constitute a capacitive feed antenna. The one end of the first type radiation electrode is located opposite to the feeding electrode of the second type radiation electrode when viewed in the direction of the length of the dielectric base.

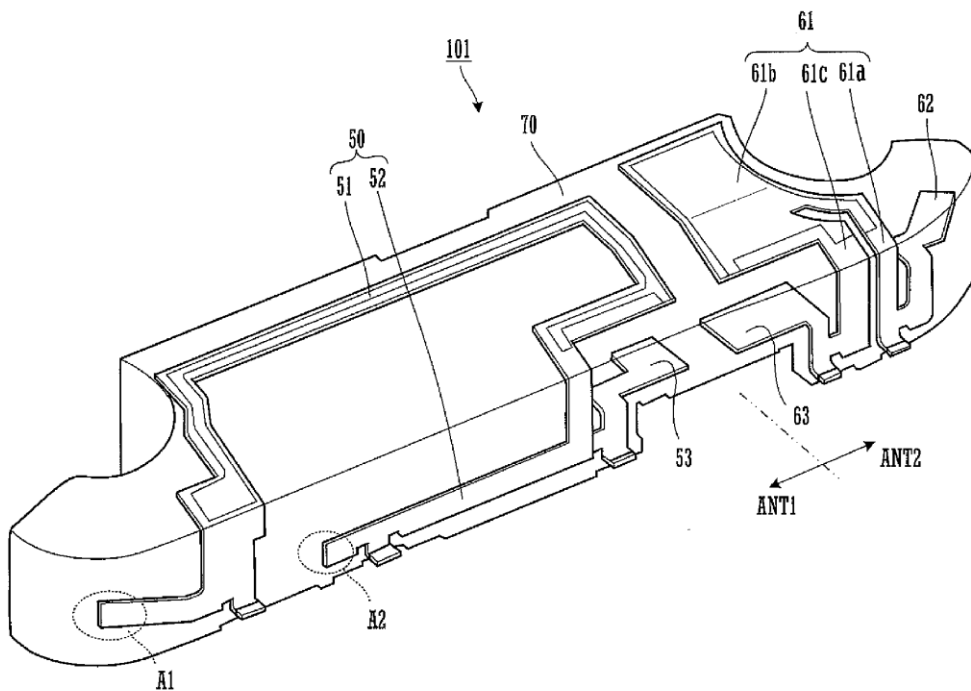
(73) Assignee: **Murata Manufacturing Co., Ltd.**, Nagaokakyo-shi (JP)

(21) Appl. No.: **12/548,753**

(22) Filed: **Aug. 27, 2009**

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2008/056467, filed on Apr. 1, 2008.





US 20090303143A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0303143 A1**

(43) **Pub. Date: Dec. 10, 2009**

(54) **ANTENNA ELEMENT**

Publication Classification

(76) Inventors: Akira Miyoshi, Tokyo (JP); Kozo Shimizu, Akita (JP)

(51) **Int. Cl.**
H01Q 1/38 (2006.01)
H01Q 21/00 (2006.01)

(52) **U.S. Cl.** 343/728; 343/700 MS

Correspondence Address:
WHITHAM, CURTIS & CHRISTOFFERSON & COOK, P.C.
11491 SUNSET HILLS ROAD, SUITE 340
RESTON, VA 20190 (US)

(57) **ABSTRACT**

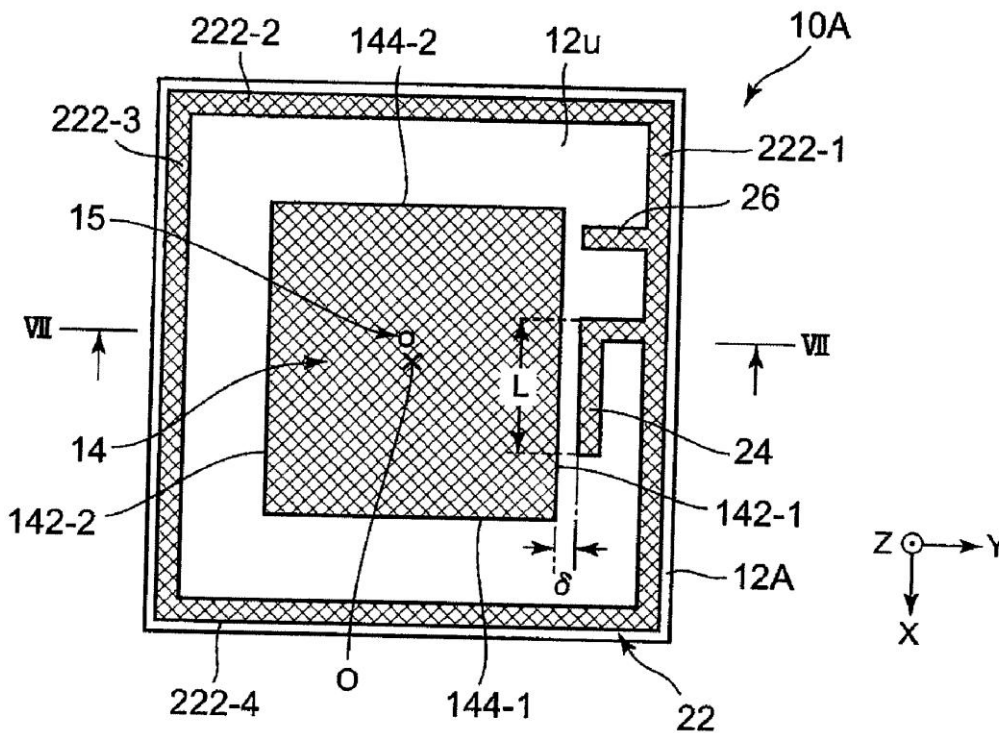
An antenna element is disclosed. A substrate is made of dielectric material and has a first face. A first antenna element is made of conductive material and is provided on the first face. A first power feeding portion is made of conductive material and is disposed on the first antenna element. A second antenna element is made of conductive material, is provided on the first face, and forms a loop surrounding the first antenna element with a gap. A second power feeding portion is made of conductive material. The second power feeding portion is extended from the second antenna element toward the first antenna element and is arranged to form an electromagnetic coupling with the first antenna element. A perturbation element is made of conductive material and is extended from the second antenna element. A length of loop is twice a circumferential length of the first antenna element.

(21) Appl. No.: 12/477,379

(22) Filed: Jun. 3, 2009

(30) **Foreign Application Priority Data**

Jun. 4, 2008 (JP) P2008-147182





US 20090303146A1

(19) **United States**

(12) **Patent Application Publication**
Wu

(10) **Pub. No.: US 2009/0303146 A1**

(43) **Pub. Date: Dec. 10, 2009**

(54) **SLOT ANTENNA**

(30) **Foreign Application Priority Data**

(75) Inventor: **Sueng-Chien Wu, Tu-Cheng (TW)**

Jun. 10, 2008 (CN) 200820301090.8

Publication Classification

Correspondence Address:

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

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

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

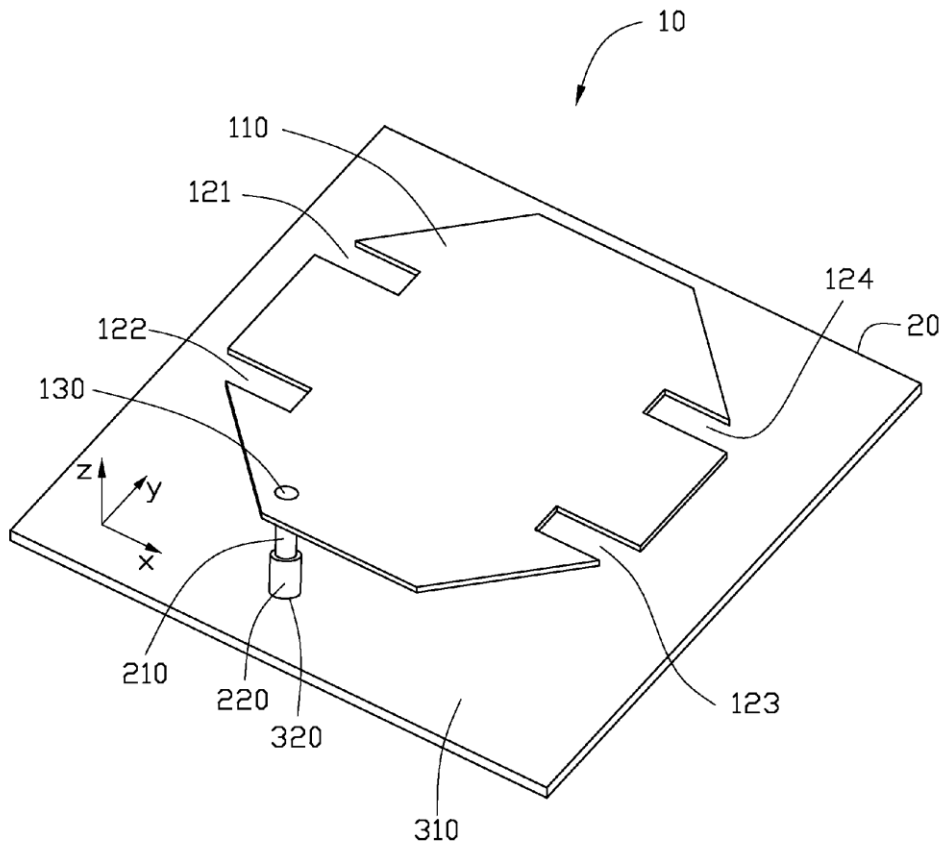
(57) **ABSTRACT**

A slot antenna is located on a substrate and includes a grounding portion, a radiating portion, and a feeding portion. The grounding portion is positioned on the substrate. The radiating portion is symmetrically octagonal-shaped and defines four trapezoidal-shaped slots on opposite sides. The radiating portion is parallel to the grounding portion. The feeding portion electrically connects the radiating portion to the grounding portion for feeding electromagnetic signals to the slot antenna.

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

(21) Appl. No.: **12/233,598**

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





US 20090315780A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0315780 A1**

(43) **Pub. Date: Dec. 24, 2009**

(54) **INVERTED-F ANTENNA**

Publication Classification

(75) Inventors: **Jia-Jiu Song**, Jhonghe City (TW);
Jr-Ren Jeng, Taipei City (TW);
Mu-Kun Hsueh, Kaohsiung City (TW)

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

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

Correspondence Address:
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DAYTON, OH 45459-4238 (US)

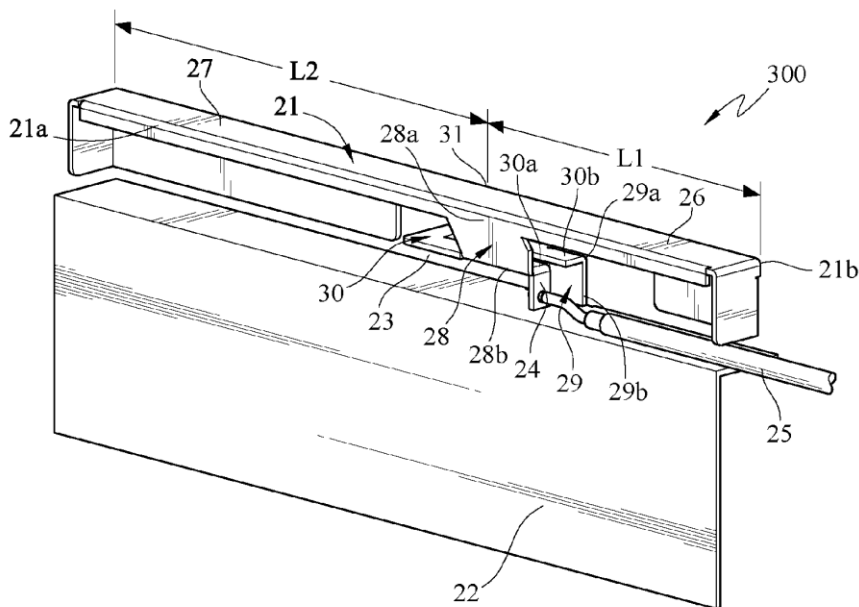
(57) **ABSTRACT**

An inverted-F antenna includes a radiation element, a ground element, a loop conductive pin, a signal feed-in portion, and a signal line. The antenna is designed as the signal feed-in portion and the ground portion sharing a single pin, thus solving the problem of the conventional inverted-F antenna having complicated components and increased cost due to using two independent components in parallel including a conductive pin and a signal feed-in portion for grounding and receiving feed-in signals.

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

(21) Appl. No.: **12/144,831**

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





US 20090315781A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0315781 A1**

(43) **Pub. Date: Dec. 24, 2009**

(54) **DUAL-BAND ANTENNA**

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

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

Publication Classification

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

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

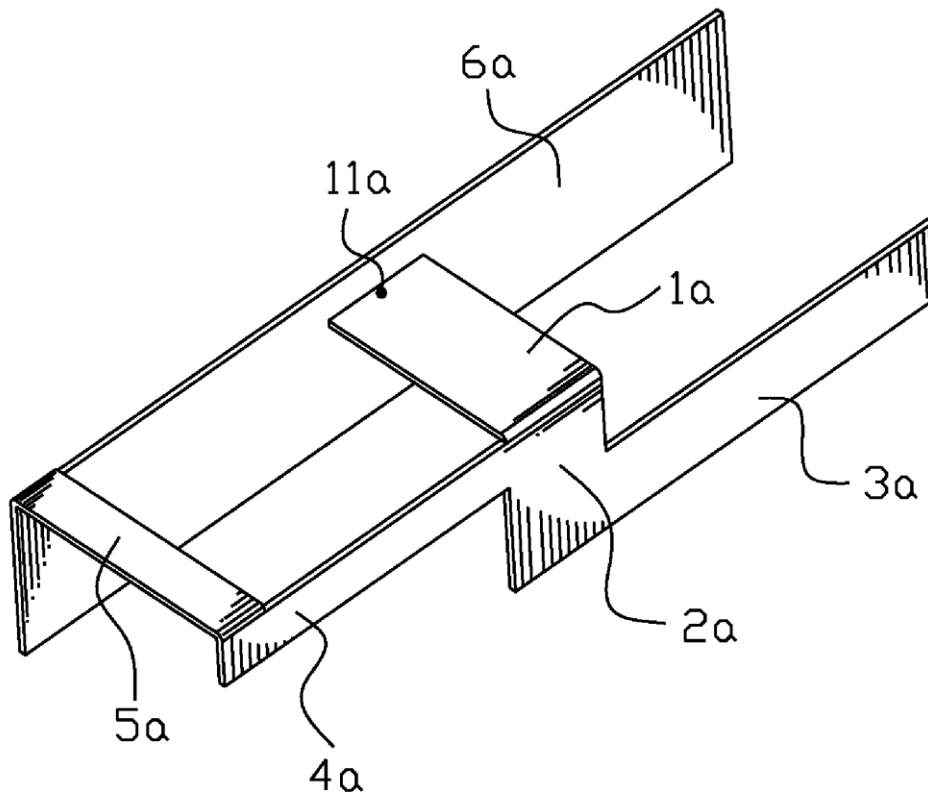
(57) **ABSTRACT**

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

A dual-band antenna has a feeding conductor with a feeding point and a connecting portion extending downwardly from the feeding conductor. A first radiating conductor and a loop protrusion respectively extend outward from two opposite sides of the connecting portion. A grounding portion faces the loop protrusion and is spaced apart from the feeding conductor to form a small gap therebetween. A loop connection is disposed away from the feeding conductor and connects an upper portion of the loop protrusion and an upper portion of the grounding portion.

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

(21) Appl. No.: **12/145,418**





US 20090315782A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0315782 A1**

(43) **Pub. Date: Dec. 24, 2009**

(54) **ANTENNA OF MOBILE PHONE**

Publication Classification

(75) Inventors: **DA RUAN**, SHANGHAI CITY (CN); **DAVID HO**, TAIPEI (TW)

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

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

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

(73) Assignee: **INVENTEC APPLIANCES CORP.**

(57) **ABSTRACT**

(21) Appl. No.: **12/551,223**

(22) Filed: **Aug. 31, 2009**

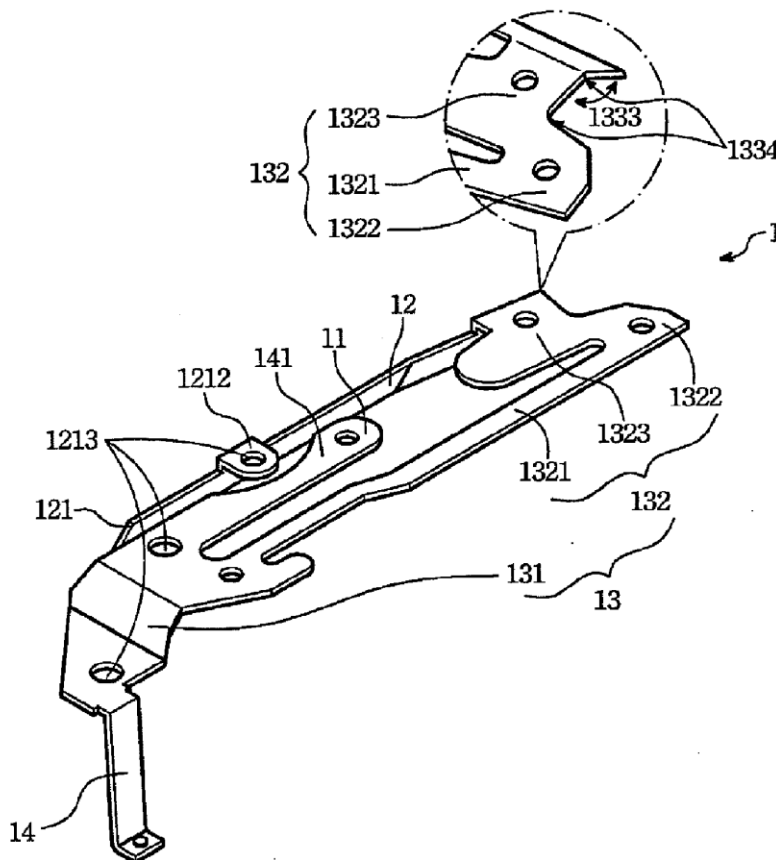
An antenna is embedded in a mobile phone and comprises a receiving sheet structure, a high frequency radiation part, a low frequency radiation part, and an extending part. The receiving sheet structure comprises a main body and a branch portion, and one end of said branch portion is connected to the main body and another end is connected to a curved part. Therefore one end of the high frequency radiation part is connected to a terminal of the curved part with a curved angle formed thereof, and another end of the high frequency radiation part is an open end and parallel to the branch portion. One end of the low frequency radiation part is connected to the main body, and another end of the low frequency radiation part is an open end. The extending part is connected to a terminal of the receiving sheet structure, and perpendicularly extended to the terminal of the receiving sheet structure.

Related U.S. Application Data

(63) Continuation of application No. 11/508,856, filed on Aug. 24, 2006.

(30) **Foreign Application Priority Data**

Aug. 26, 2005 (TW) 94214786





US 20090315785A1

(19) **United States**

(12) **Patent Application Publication**
YANG

(10) **Pub. No.: US 2009/0315785 A1**

(43) **Pub. Date: Dec. 24, 2009**

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

(30) **Foreign Application Priority Data**

Jun. 20, 2008 (CN) 200810302241.6

(75) Inventor: **CHIH-YUAN YANG, Tu-Cheng (TW)**

Publication Classification

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

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

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

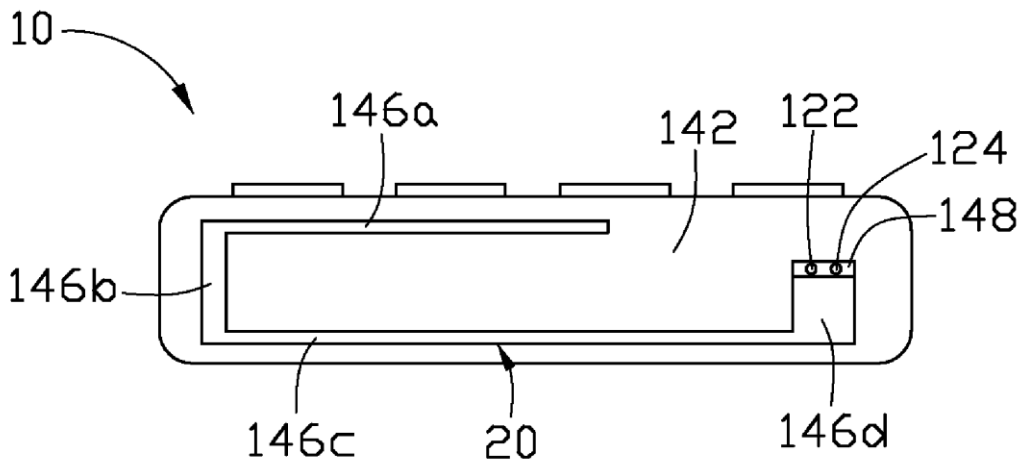
(57) **ABSTRACT**

An antenna includes a metallic sheet defining a first slot, a second slot, a third slot parallel to the first slot, and a fourth slot parallel to the second slot. The second slot perpendicularly connects the first slot to the third slot and has a length greater than that of the fourth slot. The third slot has a length greater than that of the first slot. The fourth slot extends perpendicularly from a side of the third slot away from the second slot. A feeding point is formed on the metallic sheet at a side of the fourth slot away from the third slot. A grounding point is formed on the metallic sheet at a side of the fourth slot away from the third slot at a position different from that of the feeding point.

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

(21) Appl. No.: **12/261,050**

(22) Filed: **Oct. 30, 2008**





US 20090315786A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0315786 A1**

(43) **Pub. Date: Dec. 24, 2009**

(54) **ANTENNA WITH INCREASED ELECTRICAL LENGTH AND WIRELESS COMMUNICATION DEVICE INCLUDING THE SAME**

(30) **Foreign Application Priority Data**

Mar. 31, 2006 (KR) 10-2006-0029327
Apr. 12, 2006 (KR) 10-2006-0033029

(75) Inventors: **Byung Hoon Ryou**, Seoul (KR);
Won Mo Sung, Gyeonggi-do (KR);
Gi Ho Kim, Gyeonggi-do (KR);
Yun Bok Lee, Seoul (KR); **Jun Woo Park**, Seoul (KR)

Publication Classification

(51) **Int. Cl.**
H01Q 1/38 (2006.01)
H01Q 1/24 (2006.01)
H01Q 1/40 (2006.01)

(52) **U.S. Cl.** **343/702; 343/873; 343/700 MS**

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

(57) **ABSTRACT**

Disclosed is an antenna with an extended electrical length, including radiators (110, 210, 310), (410 and 510) having S-shaped or spiral-shaped cells (112, 212, 312 and 512). The cells (112, 212, 312 and 512) are formed on the front surface of the boards (120, 220, 320, 420 and 520), and two or more of the cells are connected in series by connectors (114, 214 and 314) formed on the rear surface of the board. Furthermore, the antenna includes a ground stub (150) and a parasitic element (160) electromagnetically coupled to the radiators (110, 210, 310, 410 and 510), and has a good radiation characteristic. Furthermore, the antenna can include the cells (112, 212, 312 and 512) of different sizes and can thus have a multi-band characteristic.

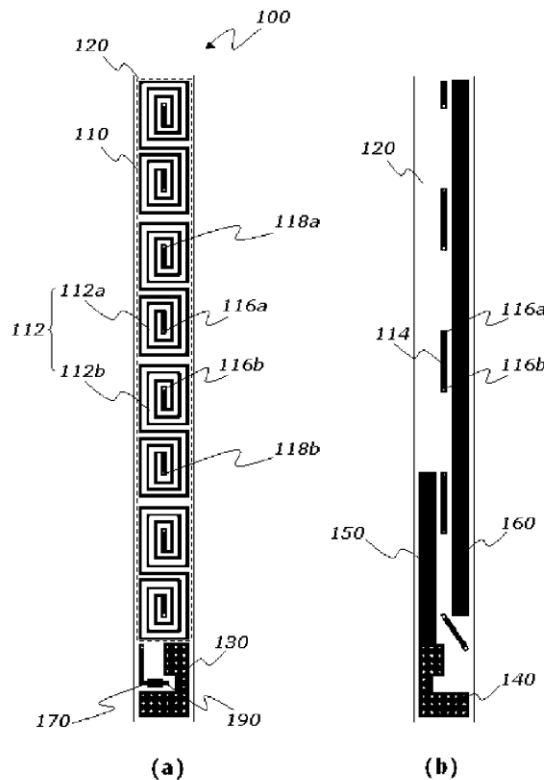
(73) Assignee: **E.M.W. Antenna Co., Ltd.**, Seoul (KR)

(21) Appl. No.: **12/281,621**

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

(86) PCT No.: **PCT/KR07/01575**

§ 371 (c)(1),
(2), (4) Date: **Jan. 20, 2009**





US 20090315787A1

(19) **United States**

(12) **Patent Application Publication**
Schätzle

(10) **Pub. No.: US 2009/0315787 A1**

(43) **Pub. Date: Dec. 24, 2009**

(54) **ANTENNA ARRANGEMENT FOR HEARING DEVICE APPLICATIONS**

(75) Inventor: **Ulrich Schätzle, Erlangen (DE)**

Correspondence Address:
SIEMENS CORPORATION
INTELLECTUAL PROPERTY DEPARTMENT
170 WOOD AVENUE SOUTH
ISELIN, NJ 08830 (US)

(73) Assignee: **SIEMENS AUDIOLOGISCHE
TECHNIK GMBH, Erlangen (DE)**

(21) Appl. No.: **12/309,712**

(22) PCT Filed: **Jul. 27, 2007**

(86) PCT No.: **PCT/EP2007/057745**

§ 371 (c)(1),
(2), (4) Date: **Jan. 27, 2009**

Related U.S. Application Data

(60) Provisional application No. 60/834,310, filed on Jul. 28, 2006.

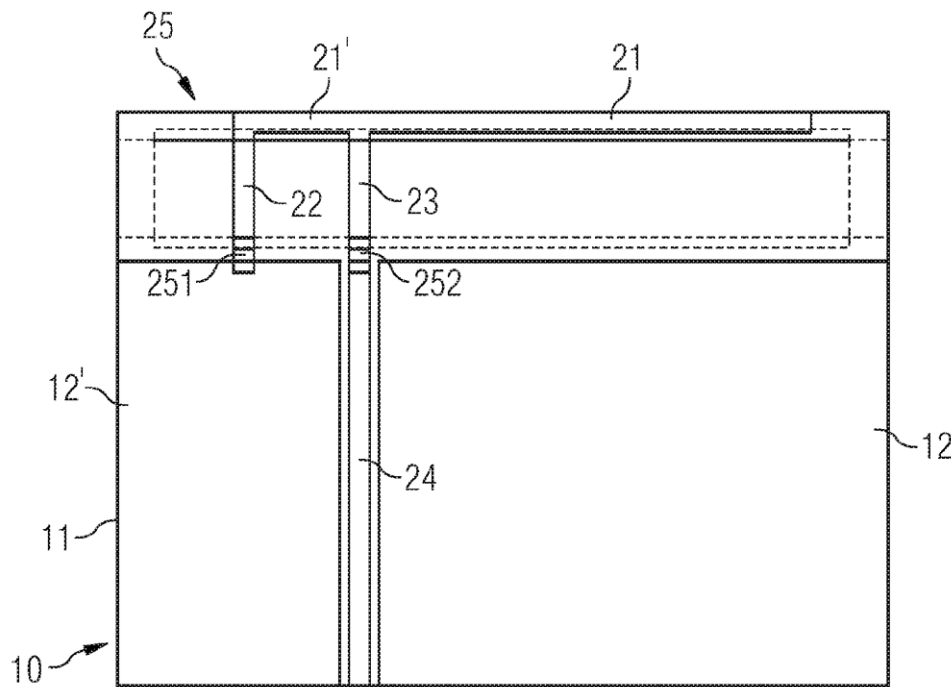
Publication Classification

(51) **Int. Cl.**
H01Q 7/08 (2006.01)
H01Q 1/24 (2006.01)
H01Q 21/00 (2006.01)

(52) **U.S. Cl.** **343/702; 343/728; 343/788**

(57) **ABSTRACT**

A device having an electric antenna and a magnetic antenna is described, the antennas being spatially arranged in immediate mutual proximity. The electric antenna has at least one current-carrying electric conductor which acts as a resonator for the electric antenna, while the magnetic antenna has a coil with at least one current-carrying conductor loop which acts as an inductor of the magnetic antenna. Thus the electric antenna and the magnetic antenna are spatially arranged relative to each other such that the direction of the current in the electric conductor of the electric antenna extends substantially at right angles to the direction of the current in the conductor loop of the magnetic antenna.





US 20090315788A1

(19) **United States**

(12) **Patent Application Publication**
Hirota

(10) **Pub. No.: US 2009/0315788 A1**

(43) **Pub. Date: Dec. 24, 2009**

(54) **ELECTRONIC DEVICE**

(30) **Foreign Application Priority Data**

(75) Inventor: **Toshiyuki Hirota**, Hino-shi (JP)

Jun. 24, 2008 (JP) 2008-164945

Publication Classification

Correspondence Address:

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

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

(52) **U.S. Cl.** **343/702; 361/679.27**

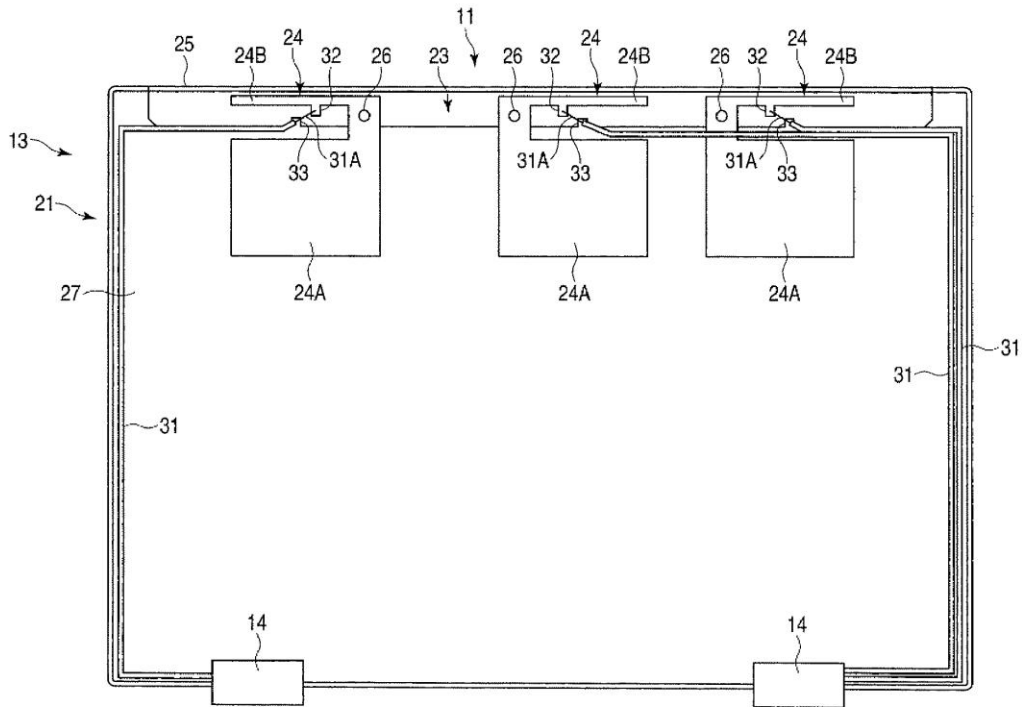
(57) **ABSTRACT**

According to one embodiment, an electronic device includes a metal-made housing including an opening portion, an antenna provided to partially overlap with the opening portion within the housing, with which radio communications are carried out with an outside, and an insulating cover provided to close the opening portion. The cover is fixed to the housing via the antenna.

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

(21) Appl. No.: **12/404,121**

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





US 20090315789A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0315789 A1**

(43) **Pub. Date: Dec. 24, 2009**

(54) **ANTENNA DEVICE OF MOBILE TERMINAL**

(30) **Foreign Application Priority Data**

(75) Inventors: **Sang Bong SUNG**, Gumi-si (KR);
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Jae Ho LEE, Yongin-si (KR)

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

Publication Classification

(51) **Int. Cl.**
H01Q 1/48 (2006.01)
H01Q 1/24 (2006.01)

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

(57) **ABSTRACT**

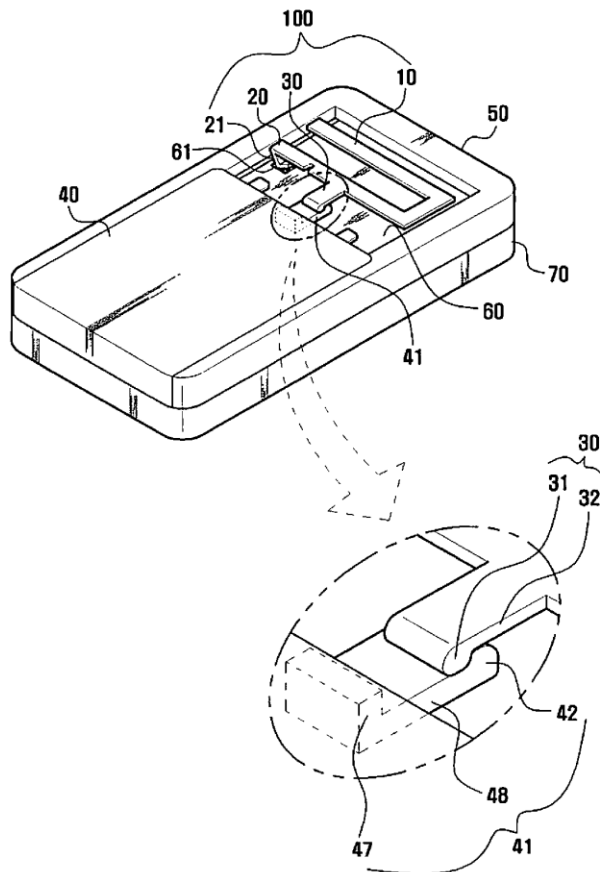
Correspondence Address:
THE FARRELL LAW FIRM, LLP
290 Broadhollow Road, Suite 210E
Melville, NY 11747 (US)

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

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

(21) Appl. No.: **12/489,044**

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





US 20090315793A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0315793 A1**

(43) **Pub. Date: Dec. 24, 2009**

(54) **ELECTRONIC DEVICE, ANTENNA
THEREOF, AND METHOD OF FORMING
THE ANTENNA**

(76) Inventors: **Yin-Yu CHEN**, Hsichih (TW);
Chen-Yu Chou, Hsichih (TW);
Ming-Feng Tsai, Hsichih (TW);
Chih-Wei Lee, Taipei (TW)

Correspondence Address:
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(21) Appl. No.: **12/405,927**

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

(30) **Foreign Application Priority Data**

Jun. 20, 2008 (TW) 097123141

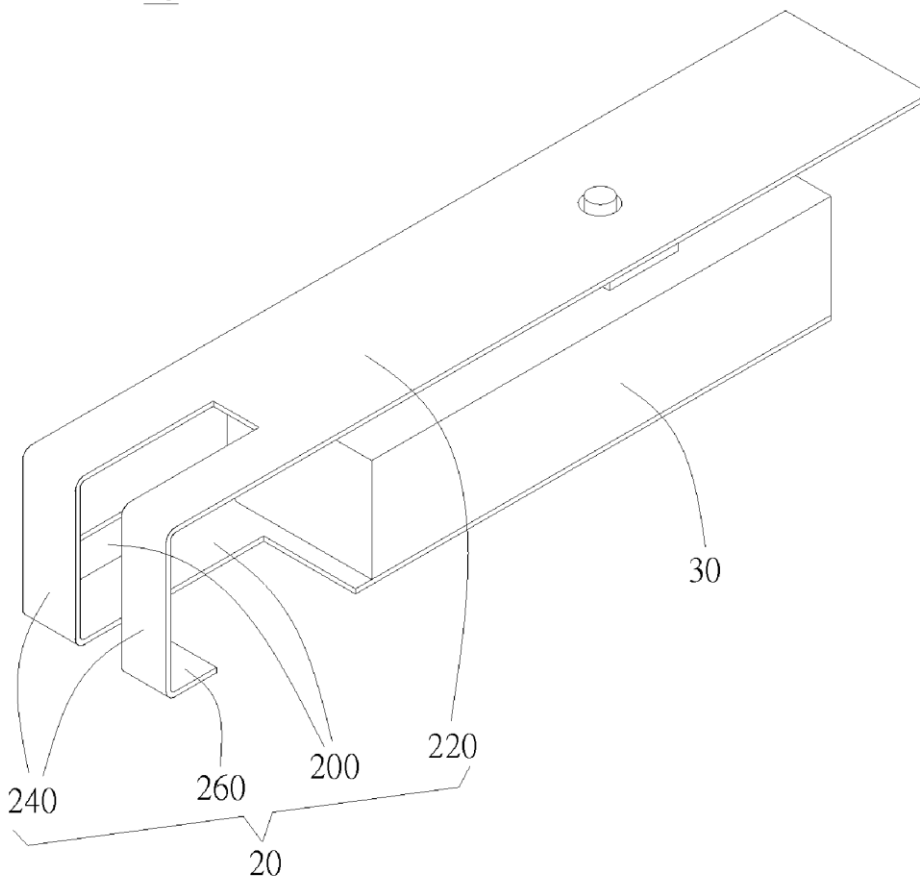
Publication Classification

(51) **Int. Cl.**
H01Q 9/06 (2006.01)
H01Q 1/22 (2006.01)
H01P 11/00 (2006.01)

(52) **U.S. Cl.** **343/745; 343/702; 29/600**

(57) **ABSTRACT**

The antenna of the invention includes a transceiver unit and a dielectric unit. The transceiver unit has a ground portion, a radial portion, a conductive portion and a feed portion. The ground portion and the radial portion are disposed apart in parallel, so as to form a space therebetween. The distance between the ground portion and the radial portion is defined as a transceiver unit height. The dielectric unit is disposed in the space. That is, the dielectric unit is disposed between the ground portion and the radial portion. The dielectric unit has a dielectric unit thickness less than the transceiver unit height. In one embodiment, the ratio of the dielectric unit thickness to the transceiver unit height is preferably between 0.4 and 0.7.





US 20090315806A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0315806 A1**

(43) **Pub. Date: Dec. 24, 2009**

(54) **DIELECTRICALLY LOADED ANTENNA**

(30) **Foreign Application Priority Data**

(76) Inventors: **Oliver Paul Leisten,**
Northamptonshire (GB); **Nicholas**
Roger Padfield, Warwickshire (GB)

May 13, 2008 (GB) 0808661.3

Publication Classification

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ALSTON & BIRD LLP
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TRYON STREET, SUITE 4000
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(51) **Int. Cl.**
H01Q 1/36 (2006.01)

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

(57) **ABSTRACT**

A dielectrically loaded multifilar antenna has an electrically insulative solid core bearing an antenna element structure having four pairs of substantially helical radiating elements spaced apart around a central axis of the antenna. Each pair of oppositely located antenna elements forms part of a conductive loop having an effective electrical length in the region of N guide wavelengths at the operating frequency, where N is an integer and is at least 2. Typically, each helical element executes substantially a full turn around the axis on the outer surface of the core. The antenna offers an improved gain-bandwidth product compared with typical prior dielectrically loaded multifilar helical antennas, and a 3dB beamwidth of at least 90° for circularly polarized radiation.

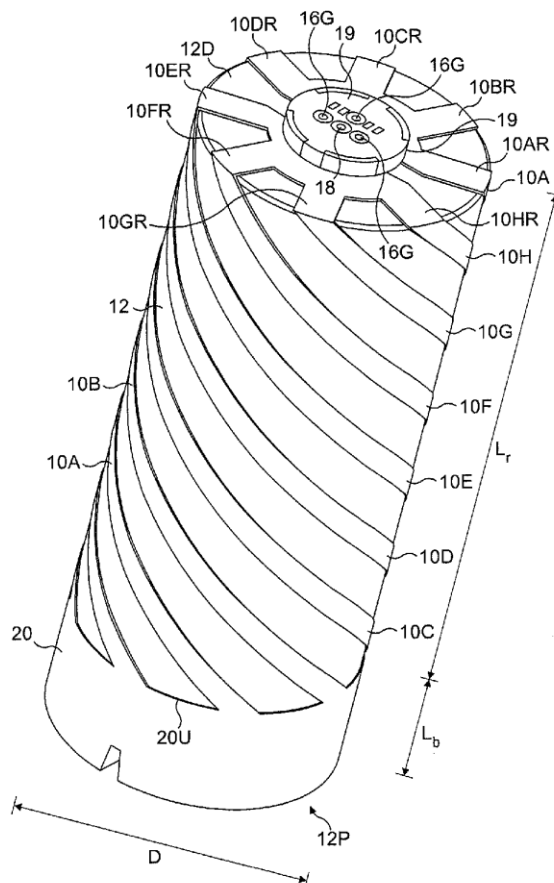
(21) Appl. No.: **12/465,395**

(22) Filed: **May 13, 2009**

Related U.S. Application Data

(63) Continuation-in-part of application No. 11/970,740, filed on Jan. 8, 2008.

(60) Provisional application No. 61/106,654, filed on Oct. 20, 2008.





US 20090316612A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0316612 A1**

(43) **Pub. Date: Dec. 24, 2009**

(54) **SINGLE CABLE ANTENNA MODULE FOR LAPTOP COMPUTER AND MOBILE DEVICES**

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

Related U.S. Application Data

(75) Inventors: **Gregory Poilasne**, El Cajon, CA (US); **Maha Achour**, San Diego, CA (US); **Ajay Gummalla**, San Diego, CA (US); **Vaneet Pathak**, San Diego, CA (US); **Ryan Robert Bartsch**, Alpine, CA (US); **Angela Mae Dodd**, Oceanside, CA (US)

(60) Provisional application No. 61/050,954, filed on May 6, 2008.

Publication Classification

(51) **Int. Cl.**
H04L 5/00 (2006.01)
H04W 4/00 (2009.01)

(52) **U.S. Cl.** **370/297; 370/329**

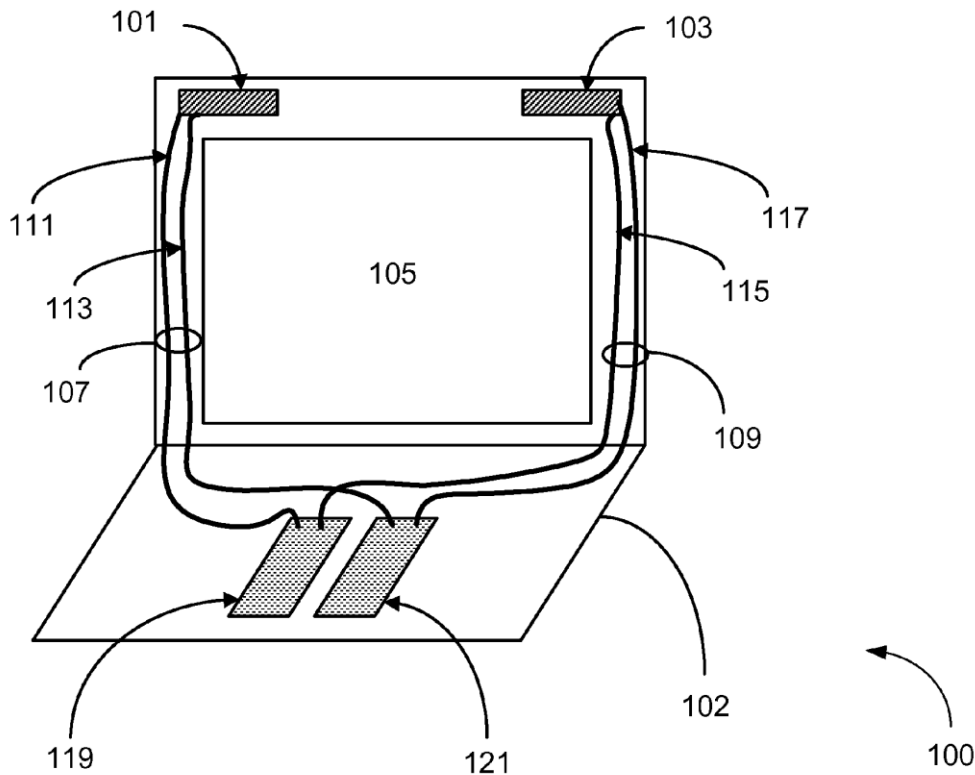
Correspondence Address:
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(57) **ABSTRACT**

Implementations and examples of wireless communication systems based on multi-frequency antennas each operating at different frequency bands for wireless communications, including multi-frequency antennas based on metamaterial structures.

(73) Assignee: **Rayspan Corporation**

(21) Appl. No.: **12/431,689**





US 20090322617A1

(19) **United States**

(12) **Patent Application Publication**
Tseng

(10) **Pub. No.: US 2009/0322617 A1**

(43) **Pub. Date: Dec. 31, 2009**

(54) **THIN ANTENNA AND AN ELECTRONIC DEVICE HAVING THE THIN ANTENNA**

(30) **Foreign Application Priority Data**

Jun. 26, 2008 (TW) 097123919

(75) Inventor: **Kuan-Hsueh Tseng, Taipei Hsien (TW)**

Publication Classification

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

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

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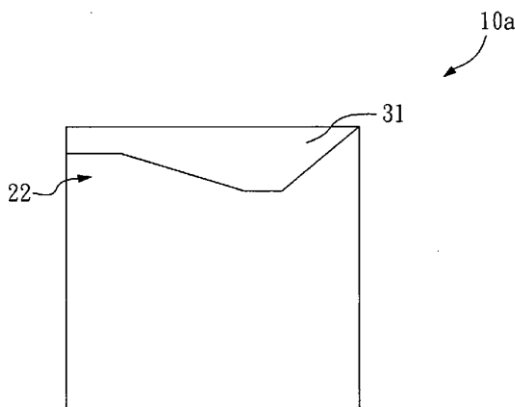
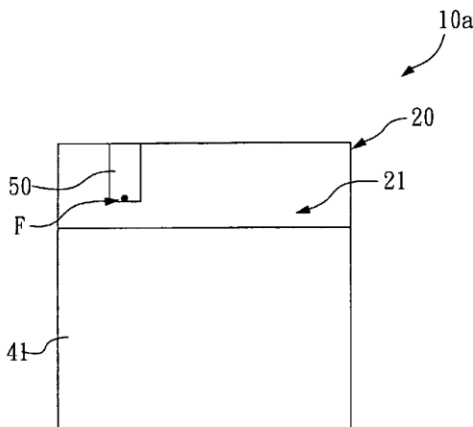
(57) **ABSTRACT**

A thin antenna for wireless signal transmission of an electronic device is disclosed. The thin antenna comprises a base board, a first radiation area, a first ground area and a feeding plane. The base board has a first plane and a second plane. The first radiation area is printed on the second plane. The first ground area is printed on the first plane. The feeding plane is printed on the first plane. The feeding plane has a feeding point. Wherein the area of the feeding plane is smaller than the area of the first radiation area, and the area of the feeding plane is partly covered by the region which is projected from the first radiation area corresponding to the first plane.

(73) Assignee: **WISTRON NEWEB CORP,**
Taipei Hsien 221 (TW)

(21) Appl. No.: **12/385,111**

(22) Filed: **Mar. 31, 2009**





US 20090322618A1

(19) **United States**

(12) **Patent Application Publication**
Shoji

(10) **Pub. No.: US 2009/0322618 A1**

(43) **Pub. Date: Dec. 31, 2009**

(54) **MULTIBAND ANTENNA AND RADIO COMMUNICATION TERMINAL**

(30) **Foreign Application Priority Data**

Jun. 25, 2008 (JP) 2008-166421

(75) Inventor: **Hideaki Shoji, Chiba (JP)**

Publication Classification

Correspondence Address:
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P.
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(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 9/04 (2006.01)

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

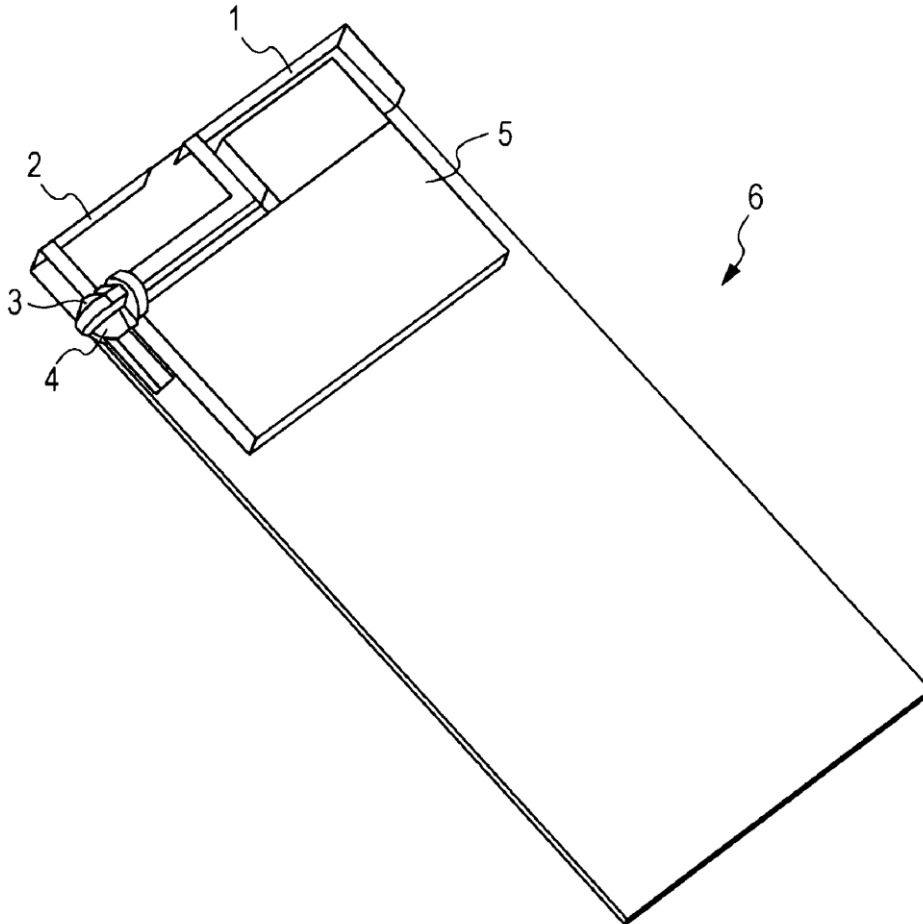
(73) Assignee: **SONY ERICSSON MOBILE COMMUNICATIONS JAPAN, INC., Tokyo (JP)**

(57) **ABSTRACT**

(21) Appl. No.: **12/473,682**

A multiband antenna includes at least two antenna elements for use in a low frequency band and a high frequency band, a feeding point unit configured to be shared by both of the antenna elements for use in the low frequency band and the high frequency band and an impedance matching unit configured to be inserted into and connected to a position between an end of the antenna element for use in the high frequency band on the side of the feeding point unit and an open end thereof.

(22) Filed: **May 28, 2009**





US 20090322619A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0322619 A1**

(43) **Pub. Date: Dec. 31, 2009**

(54) **PERFORMANCE IMPROVEMENT OF ANTENNAS**

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

(76) Inventors: **Jani Petri Juhani Ollikainen**,
Helsinki (FI); **An-Ping Zhao**,
Beijing (CN); **Jussi Olavi Rahola**,
Espoo (FI)

(52) **U.S. Cl.** **343/702; 343/846; 343/787; 29/600**

(57) **ABSTRACT**

Correspondence Address:
DITTHAVONG MORI & STEINER, P.C.
918 Prince St.
Alexandria, VA 22314 (US)

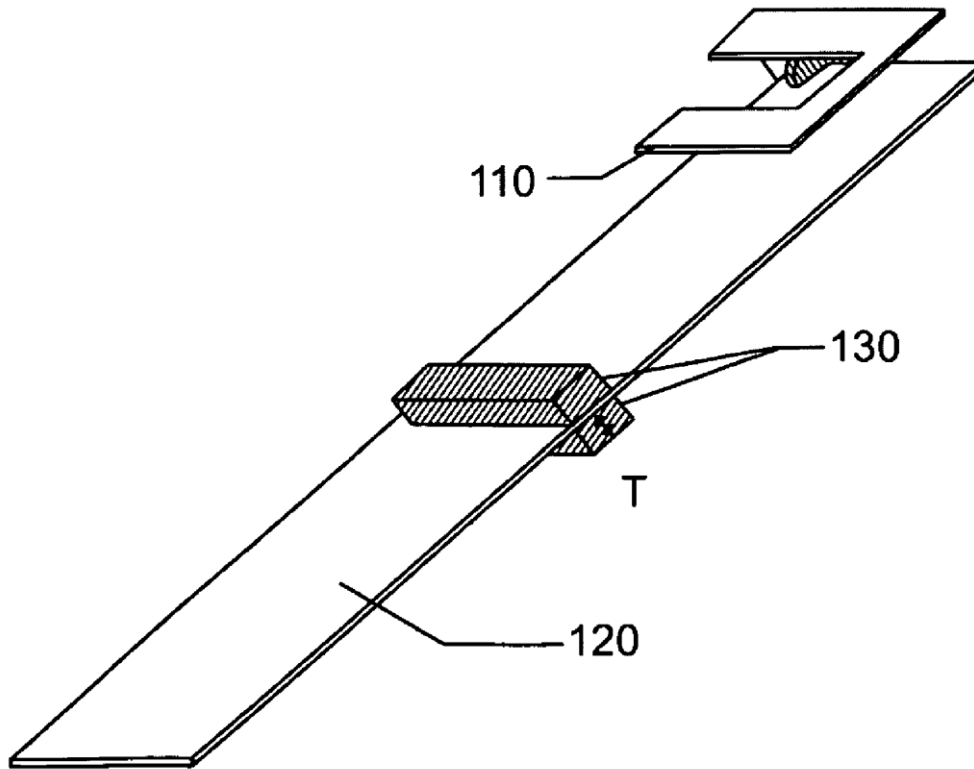
The present invention relates to an antenna arrangement, an adaptive system comprising such arrangement, a portable electronic device comprising such arrangement or adaptive system, a method of manufacturing such an arrangement, and a computer-readable storage medium encoded with instructions for performing such method. The antenna arrangement can comprise at least one antenna element (**110**) configured to supply a current, at least one ground plane element (**120**) configured to conduct the current, and at least one magnetic element (**130**) configured to influence at least a part of the current in order to modify an electrical length of the at least one ground plane element (**120**). It enables to increase the electrical length of a terminal chassis, which may increase the operation bandwidth of the antenna-chassis combination. This effect can be further increased when combining at least one slot and at least one magnetic element covering the same at least partially.

(21) Appl. No.: **12/146,595**

(22) Filed: **Jun. 26, 2008**

Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 1/48 (2006.01)





US 20090322634A1

(19) **United States**

(12) **Patent Application Publication**

Yun et al.

(10) **Pub. No.: US 2009/0322634 A1**

(43) **Pub. Date: Dec. 31, 2009**

(54) **LOOP ANTENNA**

(86) PCT No.: **PCT/KR07/05331**

(75) Inventors: **Je-Hoon Yun**, Daejon (KR);
Jung-Ick Moon, Daejon (KR);
Soon-Soo Oh, Daejon (KR);
Min-Sung Kwon, Daejon (KR);
Sung-Uk You, Daejon (KR);
Chang-Joo Kim, Daejon (KR);
Chieteuk Ahn, Daejon (KR)

§ 371 (c)(1),
(2), (4) Date: **Aug. 19, 2009**

(30) **Foreign Application Priority Data**

Oct. 26, 2006 (KR) 10-2006-0104713

Publication Classification

(51) **Int. Cl.**
H01Q 7/00 (2006.01)
H01Q 11/12 (2006.01)
H01Q 1/36 (2006.01)

(52) **U.S. Cl.** **343/741; 343/866; 343/700 MS**

(57) **ABSTRACT**

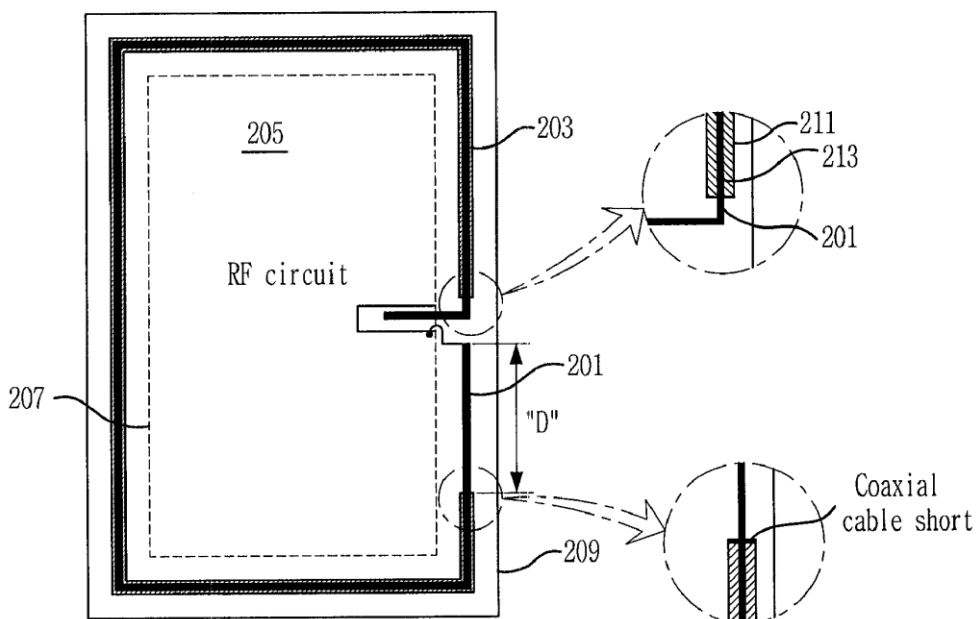
Provided is a loop antenna. The loop antenna includes a first antenna element embodied as a coaxial cable, a second antenna element embodied as a line and connected to one end of the first antenna element in series, a third antenna element embodied as a line, having one end connected to a ground plane and the other end connected to the other end of the first antenna element in series, and a power feeding cable for supplying power to the second antenna element.

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

(21) Appl. No.: **12/447,256**

(22) PCT Filed: **Oct. 26, 2007**





US 20090322638A1

(19) **United States**

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

(10) **Pub. No.: US 2009/0322638 A1**

(43) **Pub. Date: Dec. 31, 2009**

(54) **MULTIBAND ANTENNA**

(30) **Foreign Application Priority Data**

(75) Inventors: **Li-Cheng Chiang**, Tu-Cheng (TW);
Chih-Yuan Yang, Tu-Cheng (TW);
Hung-Chang Ko, Tu-Cheng (TW);
Po-Wei Kuo, Tu-Cheng (TW);
Suo-Bing Su, Tu-Cheng (TW);
Wen-Chun Chen, Tu-Cheng (TW)

Jun. 30, 2008 (CN) 200810302429.0

Publication Classification

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

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

(57) **ABSTRACT**

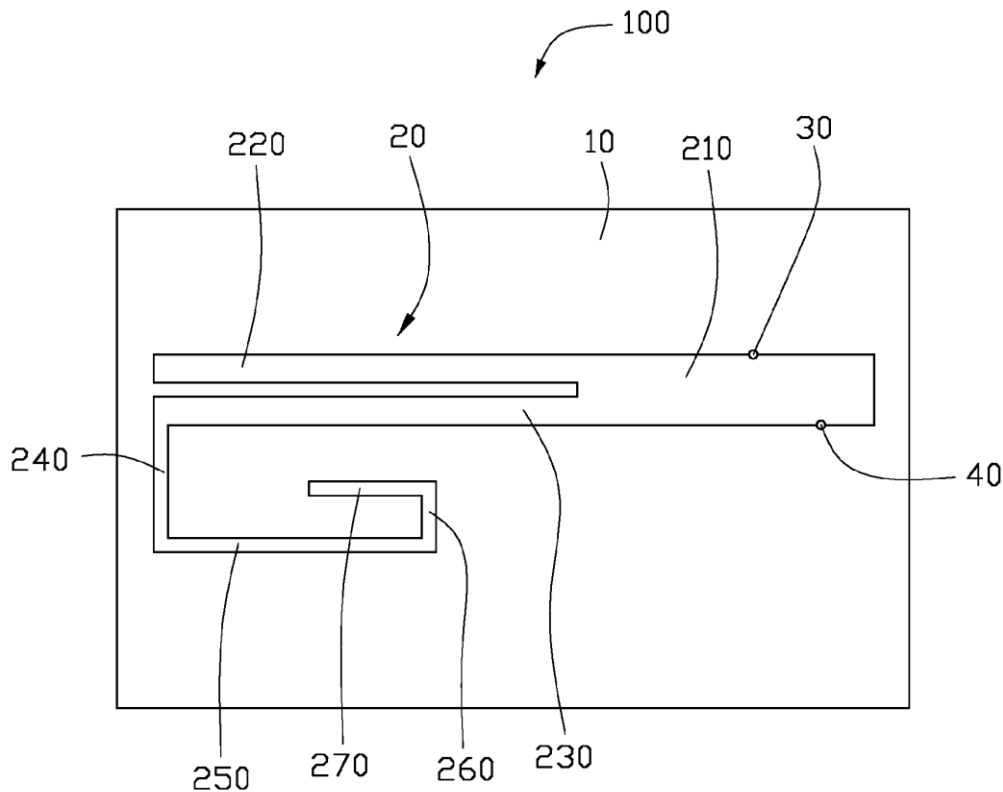
A multiband antenna includes a conductive sheet, a feeding point, and a grounding point. The conductive sheet defines a first slot, a second slot, a third slot, a fourth slot, a fifth slot, a sixth slot, and a seventh slot thereon. The second slot and the third slot extend from a same short side of the first slot and are parallel to each other. The fourth slot, the fifth slot, the sixth slot, and the seventh slot extend perpendicularly from a short side of the third slot away from the first slot in sequence. The feeding point is formed on the conductive sheet at a long side of the first slot away from the third slot. The grounding point is formed on the conductive sheet at a margin of the slots different from the location of the feeding point.

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

(21) Appl. No.: **12/241,060**

(22) Filed: **Sep. 30, 2008**





US 20090322639A1

(19) **United States**

(12) **Patent Application Publication**
Lai

(10) **Pub. No.: US 2009/0322639 A1**

(43) **Pub. Date: Dec. 31, 2009**

(54) **ANTENNA APPARATUS**

Publication Classification

(75) Inventor: **Ming-Iu Lai**, Taipei (TW)

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

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OFFICE
7 FLOOR-1, NO. 100, ROOSEVELT ROAD, SEC-
TION 2
TAIPEI 100 (TW)**

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

(57) **ABSTRACT**

An antenna apparatus including a metal layer, a first planar antenna, a second planar antenna and a conducting wire is provided. The first planar antenna has a first ground terminal electrically connected to the metal layer. The second planar antenna has a second ground terminal electrically connected to the metal layer. The conducting wire is connected between the first planar antenna and the second planar antenna. In the whole operation, electromagnetic signals transmitted by the first planar antenna and the second planar antenna are in the same frequency band, and the coupling effect of the first planar antenna and the second planar antenna is reduced along with the formation of a current loop of the conducting wire.

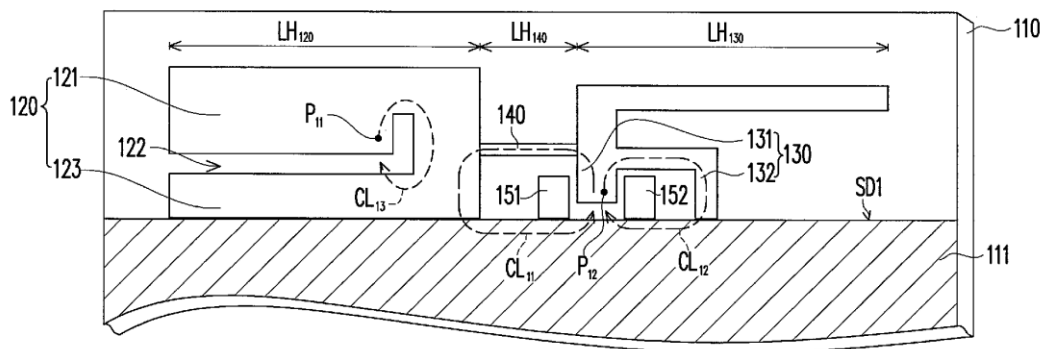
(73) Assignee: **ASUSTeK COMPUTER INC.**,
Taipei (TW)

(21) Appl. No.: **12/485,896**

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

(30) **Foreign Application Priority Data**

Jun. 27, 2008 (TW) 97124265



100



US 20090325414A1

(19) **United States**

(12) **Patent Application Publication**
Peng

(10) **Pub. No.: US 2009/0325414 A1**

(43) **Pub. Date: Dec. 31, 2009**

(54) **SECURE DIGITAL MEMORY CARD
RETAINING MECHANISM**

(30) **Foreign Application Priority Data**

Jun. 30, 2008 (CN) 200810302440.7

(75) Inventor: **Chin-Yung Peng, Tu-Cheng (TW)**

Publication Classification

Correspondence Address:

PCE INDUSTRY, INC.

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(51) **Int. Cl.**
H01R 13/62 (2006.01)

(52) **U.S. Cl.** **439/327**

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

(57) **ABSTRACT**

A secure digital memory card (SD card) retaining mechanism (100) includes a receiving member (10), an antenna (20) and a circuit board (40). The receiving member receives an SD card therein. The antenna is integrated with the receiving member. Both the receiving member and the antenna are electronically connected to the circuit board.

(21) Appl. No.: **12/330,600**

(22) Filed: **Dec. 9, 2008**

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