





US 20080055046A1

(19) **United States**

(12) **Patent Application Publication**  
**Shimizu**

(10) **Pub. No.: US 2008/0055046 A1**

(43) **Pub. Date: Mar. 6, 2008**

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

**Publication Classification**

(75) Inventor: **Takayuki Shimizu**, Tokyo (JP)

(51) **Int. Cl.**  
**H04Q 5/22** (2006.01)  
**H01Q 11/12** (2006.01)  
(52) **U.S. Cl.** ..... **340/10.1; 343/741**

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(57) **ABSTRACT**

A portable electronic device having an RFID function has an RFID antenna having a planar coil formed by winding a conductor. The RFID antenna is a loop antenna having a loop diameter corresponding to RFID with a strong electromagnetic field characteristic, and has an antenna pattern where a part of its coil turn which is other than an innermost coil turn is placed inward of the innermost coil turn. The antenna pattern can be provided by bending or branching a part of a coil turn of the conductor which is other than the innermost coil turn in such a way that the part of the coil turn is laced inward of the innermost coil turn, thereby ensuring compensation for the magnetic field strength at the center portion of the antenna and achieving excellent communications without a non-communicatable area even with the RFID having a slight electromagnetic field characteristic.

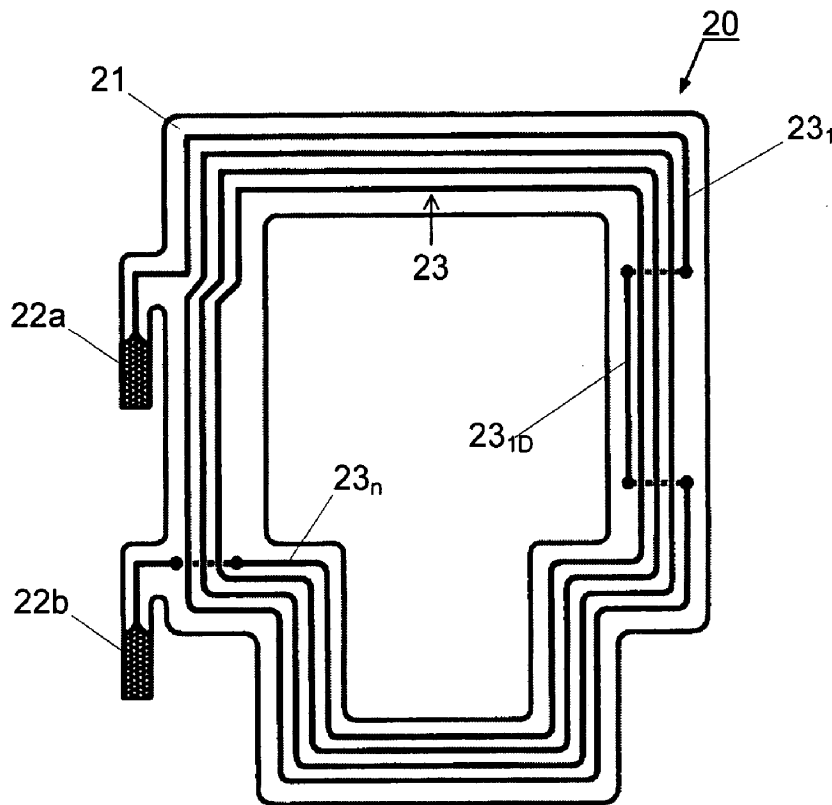
(73) Assignee: **Casio Hitachi Mobile Communications Co., Ltd.**, Tokyo (JP)

(21) Appl. No.: **11/891,270**

(22) Filed: **Aug. 9, 2007**

(30) **Foreign Application Priority Data**

Aug. 31, 2006 (JP) ..... 2006-236847  
Jul. 17, 2007 (JP) ..... 2007-185969





US 20080055160A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0055160 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **DUAL-BAND INVERTED F ANTENNA  
REDUCING SAR**

(30) **Foreign Application Priority Data**

Aug. 29, 2006 (KR) ..... 10-2006-0082099

(75) Inventors: **Yong-jin Kim**, Yongin-si (KR);  
**Gyoo-soo Chae**, Yongin-si (KR);  
**Young-cil Kim**, Yongin-si (KR);  
**Ick-jae Yoon**, Yongin-si (KR)

**Publication Classification**

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

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

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**WASHINGTON, DC 20037**

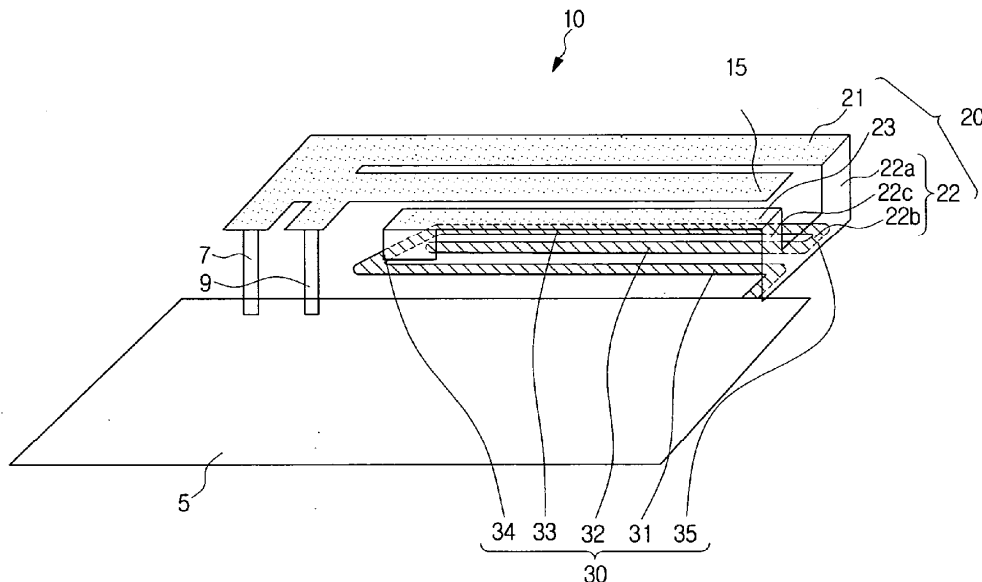
(57) **ABSTRACT**

An inverted F antenna (IFA) which reduces specific absorption rate (SAR) includes a ground; an auxiliary radiator which is attached to one end of the ground and disposed along a plane direction of the ground; a radiator which lies at an interval from the auxiliary radiator in parallel and radiates electromagnetic waves; a feed which supplies current to the radiator; and a short which interconnects the radiator with the ground and discharges the current to the ground. Accordingly, the SAR can be decreased and the antenna size can be miniaturized.

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

(21) Appl. No.: **11/703,199**

(22) Filed: **Feb. 7, 2007**





US 20080055161A1

(19) **United States**

(12) **Patent Application Publication**  
**NORO**

(10) **Pub. No.: US 2008/0055161 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **PATCH ANTENNA**

**Publication Classification**

(76) Inventor: **Junichi NORO, Akita (JP)**

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

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

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(57) **ABSTRACT**

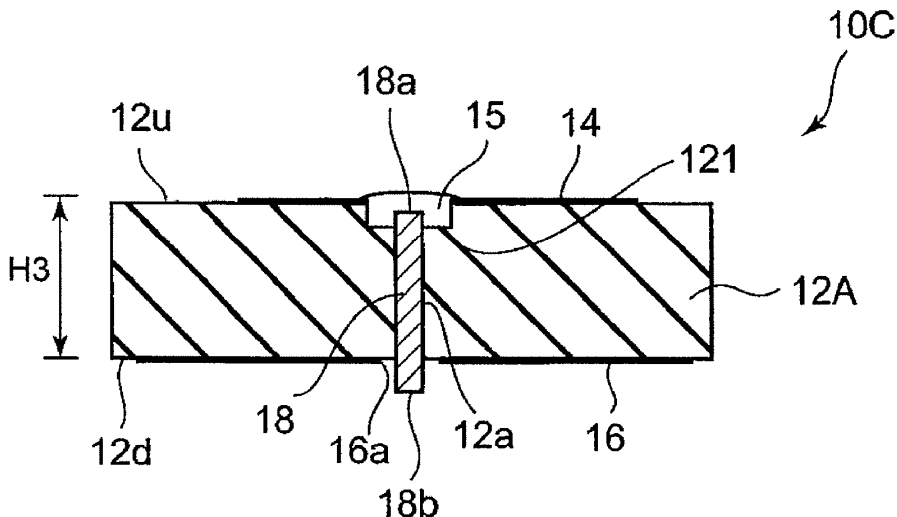
A dielectric substrate has a first face which is formed with a cavity, and a second face opposite to the first face. The dielectric substrate formed with a substrate hole which connects the cavity and the second face. An antenna radiation electrode is comprised of a conductive film and is formed on the first face of the dielectric substrate. A ground electrode is comprised of a conductive film, is formed on the second face of the dielectric substrate and is formed with a ground hole which is substantially concentric with the substrate hole and has a diameter larger than that of the substrate hole. One end of a feeding pin is connected to the antenna radiation electrode and the other end of the feeding pin is extended toward the second face of the dielectric substrate through the substrate hole and the ground hole.

(21) Appl. No.: **11/829,281**

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

(30) **Foreign Application Priority Data**

Sep. 6, 2006 (JP) ..... 2006-241706





US 20080055163A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0055163 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **MOBILE WIRELESS COMMUNICATIONS  
DEVICE HAVING DUAL ANTENNA SYSTEM  
FOR CELLULAR AND WIFI**

**Publication Classification**

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

(75) **Inventors: Ying Tong Man, Waterloo (CA);  
Yihong Qi, St. Agatha (CA)**

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

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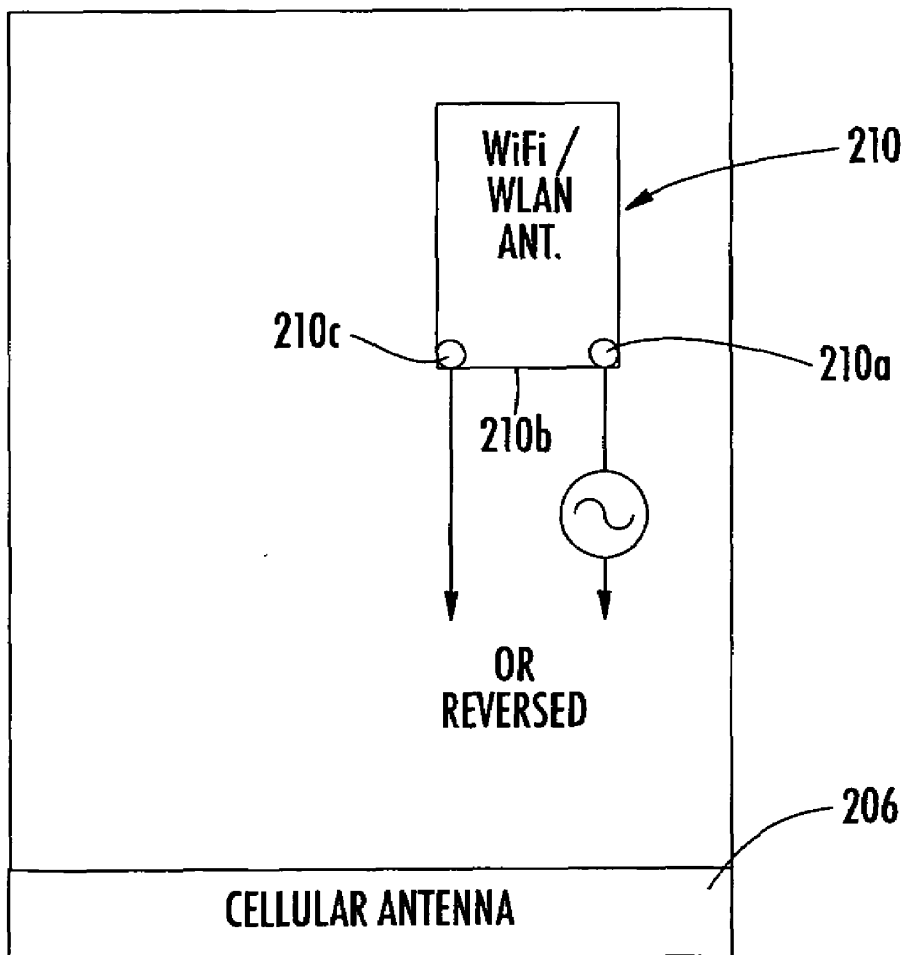
(57) **ABSTRACT**

A mobile wireless communications device includes a housing and circuit board carried by the housing. Radio Frequency (RF) circuitry is mounted on the circuit board. A first antenna is supported by the circuit board within the housing and operatively connected to the RF circuitry and configured for cellular phone communications. A second antenna is supported by the circuit board within the housing and operatively connected to the RF circuitry and configured for WiFi communications. The second antenna comprises an inverted-F or monopole antenna having an opening gap that is pointed away from the first antenna.

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

(21) **Appl. No.: 11/468,803**

(22) **Filed: Aug. 31, 2006**





US 20080055164A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0055164 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **TUNABLE ANTENNAS FOR HANDHELD DEVICES**

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

(57) **ABSTRACT**

(76) Inventors: **Zhijun Zhang**, Santa Clara, CA (US); **Ruben Caballero**, San Jose, CA (US)

A compact tunable antenna for a handheld electronic device and methods for calibrating and using compact tunable antennas are provided. The antenna can have multiple ports. Each port can have an associated feed and ground. The antenna design can be implemented with a small footprint while covering a large bandwidth. The antenna can have a radiating element formed from a conductive structure such as a patch or helix. The antenna can be shaped to accommodate buttons and other components in the handheld device. The antenna may be connected to a printed circuit board in the handheld device using springs, pogo pins, and other suitable connecting structures. Radio-frequency switches and passive components such as duplexers and diplexers may be used to couple radio-frequency transceiver circuitry to the different feeds of the antenna. Antenna efficiency can be enhanced by avoiding the use of capacitive loading for antenna tuning.

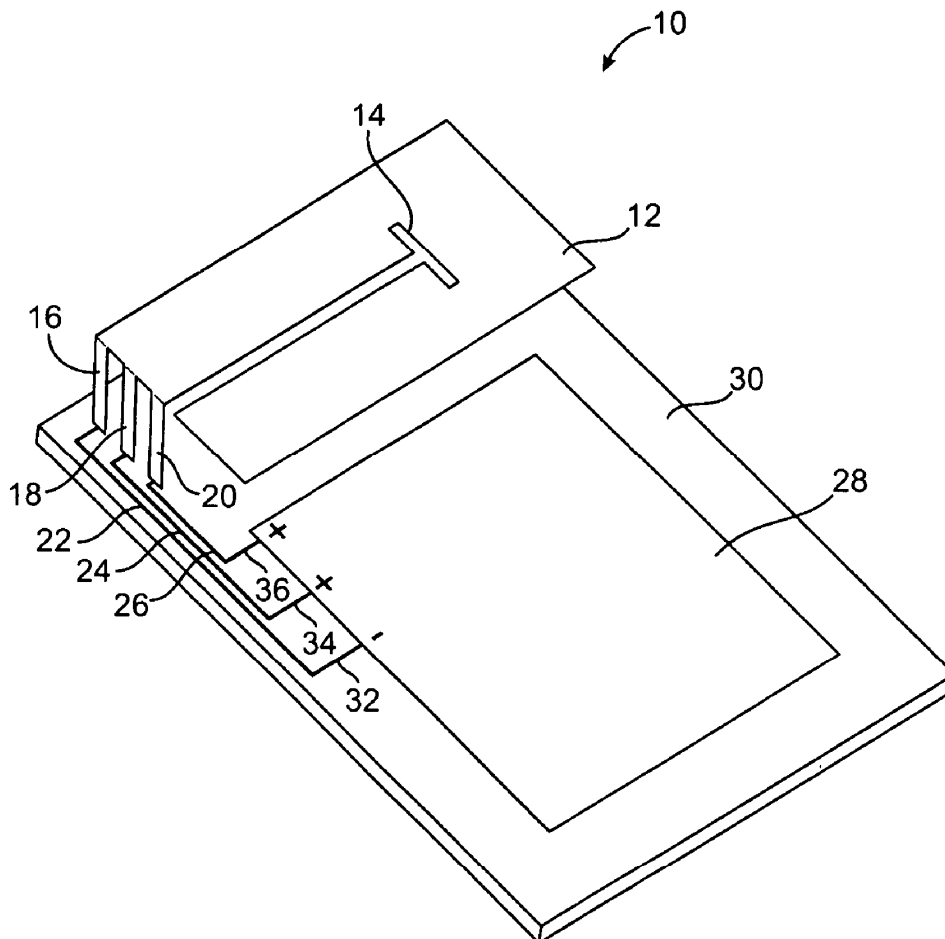
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**G. VICTOR TREYZ**  
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(21) Appl. No.: **11/516,433**

(22) Filed: **Sep. 5, 2006**

**Publication Classification**

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





US 20080055165A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0055165 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **ANTENNA DEVICE FOR PORTABLE TERMINAL**

**Publication Classification**

(75) Inventors: **Joung-Sub Shin**, Yongin-si (KR);  
**Yong-Jin Kim**, Seoul (KR);  
**Jae-Ho Lee**, Yongin-si (KR);  
**Young-Hwan Kim**, Dalseo-gu (KR)

(51) **Int. Cl.**  
**H01Q 1/24** (2006.01)  
(52) **U.S. Cl.** ..... **343/702**

(57) **ABSTRACT**

An antenna device for a portable terminal. The antenna device includes a carrier mounted in a housing of the portable terminal, at least one support extending from the carrier, a main radiator attached onto the carrier and an auxiliary radiator extending from the main radiator and fixed to ends of the supports while being spaced apart from the carrier. Since the antenna device includes the supports extending from the carrier to support the auxiliary radiator extending from the main radiator, the auxiliary radiator can be spaced apart from the carrier and the inner side of the housing of the portable terminal when the antenna device is mounted in the portable terminal. Thus, by reducing interference from a user's body or structures in the housing of the portable terminal, stable radiation performance can be secured. Moreover, the shape of the carrier can be easily changed suitably for a slim portable terminal by supporting the auxiliary support using the supports, whereby the antenna device can be easily installed in a small mounting space in a compact and slim portable terminal and an effective area of the antenna device can be minimized and an antenna gain can be improved in the same size space.

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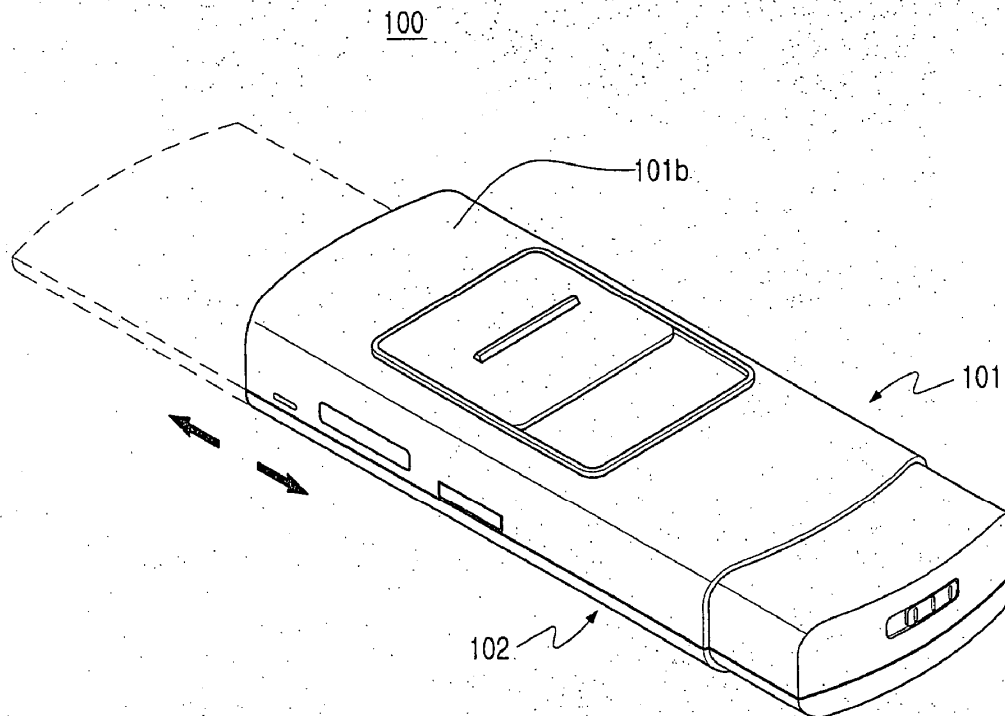
(73) Assignee: **Samsung Electronics Co. Ltd.**

(21) Appl. No.: **11/709,826**

(22) Filed: **Feb. 23, 2007**

(30) **Foreign Application Priority Data**

Sep. 4, 2006 (KR) ..... 84665/2006





US 20080055167A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0055167 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **WIRELESS COMMUNICATION DEVICE WITH INTEGRATED ANTENNA**

**Related U.S. Application Data**

(62) Division of application No. 11/227,367, filed on Sep. 15, 2005.

(75) Inventors: **Gustavo D. Leizerovich**, Aventura, FL (US); **Donald W. Burnette**, Sunrise, FL (US); **Julio C. Castaneda**, Coral Springs, FL (US); **Orlando Gomez**, Hialeah, FL (US)

**Publication Classification**

(51) **Int. Cl.**  
**H01Q 1/22** (2006.01)  
(52) **U.S. Cl.** ..... **343/702**

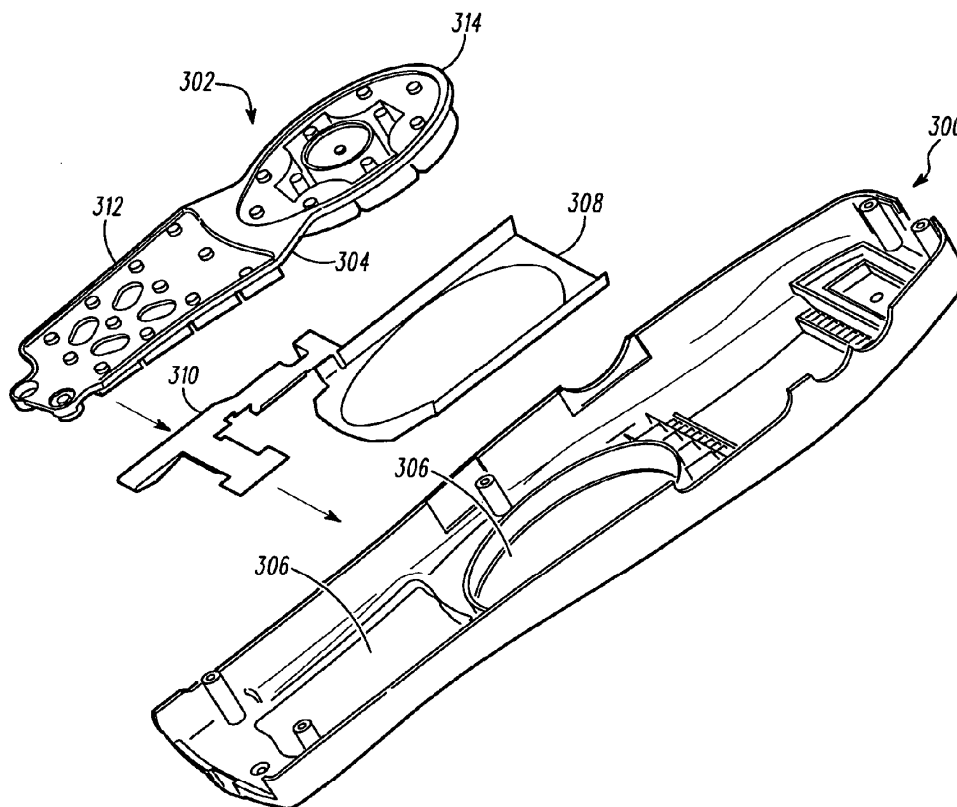
Correspondence Address:  
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551 N.W. 77TH STREET, SUITE 111  
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(57) **ABSTRACT**  
A near field communication loop antenna (308) is mechanically coupled to the cover (300) of a cellular telephone. The antenna (308) is coupled on the inside of the cover (300) between a keypad (302) and the cover (300), whereby the antenna (308) surrounds the keys (314) and is sandwiched between the keypad assembly (302) and the cover (300). A near field communication antenna (406) is coupled to the outside surface of the cover (300) surrounding a display and sandwiched between a lens (400) and the phone cover (300). A near field communication antenna embedded in the phone cover material, whereby the antenna surrounds either the keys or the display, is disclosed as well.

(73) Assignee: **Motorola, Inc.**, Schaumburg, IL

(21) Appl. No.: **11/929,317**

(22) Filed: **Oct. 30, 2007**







US 20080055169A1

(19) **United States**

(12) **Patent Application Publication**  
**Kuehne**

(10) **Pub. No.: US 2008/0055169 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **WINDOW-INTEGRATED ANTENNA IN VEHICLES**

(30) **Foreign Application Priority Data**

Dec. 17, 2003 (DE) ..... 103-59-223.7

(75) Inventor: **Rainer Kuehne, Hannover (DE)**

**Publication Classification**

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**NEW YORK, NY 10004**

(51) **Int. Cl.**  
**H01Q 1/32** (2006.01)

(73) Assignee: **ROBERT BOSCH GMBH,**  
D-70442 STUTTGART  
GERMANY (DE)

(52) **U.S. Cl.** ..... **343/713**

(21) Appl. No.: **10/583,237**

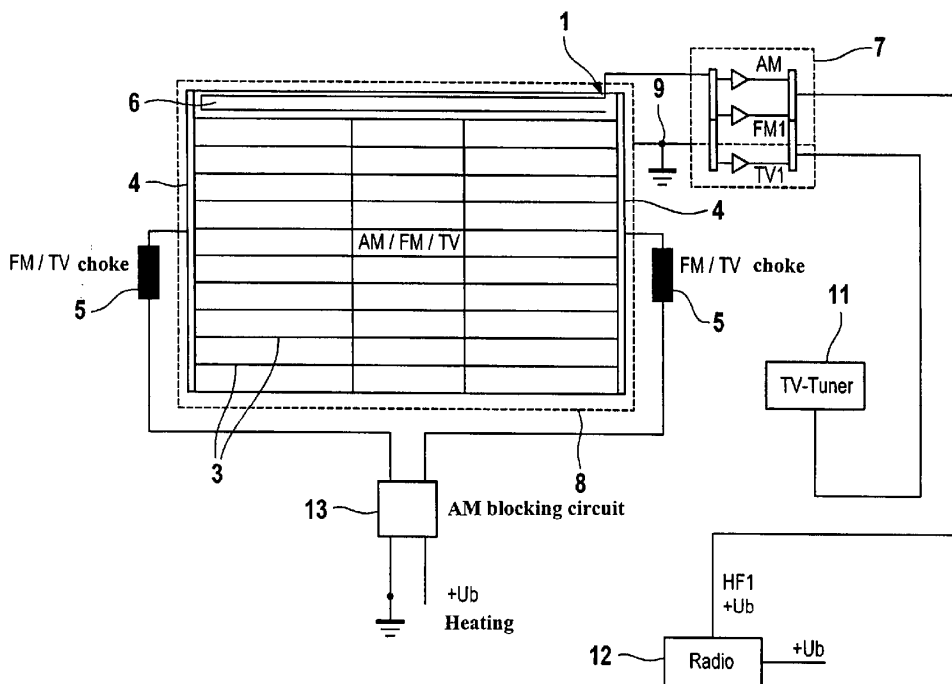
(57) **ABSTRACT**

(22) PCT Filed: **Nov. 5, 2004**

In a window-integrated antenna in vehicles, the heating conductor field is used for FM reception as well as for LMS reception. At least one decoupling element is provided for LMS reception which has a high-frequency, but non-galvanic connection to the heating conductor field. The decoupling element is situated in the heating conductor field, in particular between two adjacent heating conductors.

(86) PCT No.: **PCT/EP04/52836**

§ 371 (c)(1),  
(2), (4) Date: **May 8, 2007**





US 20080055171A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0055171 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **COMPLEX ANTENNA DEVICE**

(30) **Foreign Application Priority Data**

(76) Inventors: **Junichi NORO**, Akita (JP);  
**Hisashi Takisawa**, Akita (JP);  
**Naoto Kondo**, Akita (JP); **Yuichi Saito**, Akita (JP); **Toshiaki Aizawa**, Akita (JP)

Sep. 4, 2006 (JP) ..... P2006-238792

**Publication Classification**

(51) **Int. Cl.**  
*H01Q 21/00* (2006.01)  
*H01Q 1/32* (2006.01)

(52) **U.S. Cl.** ..... 343/715; 343/725

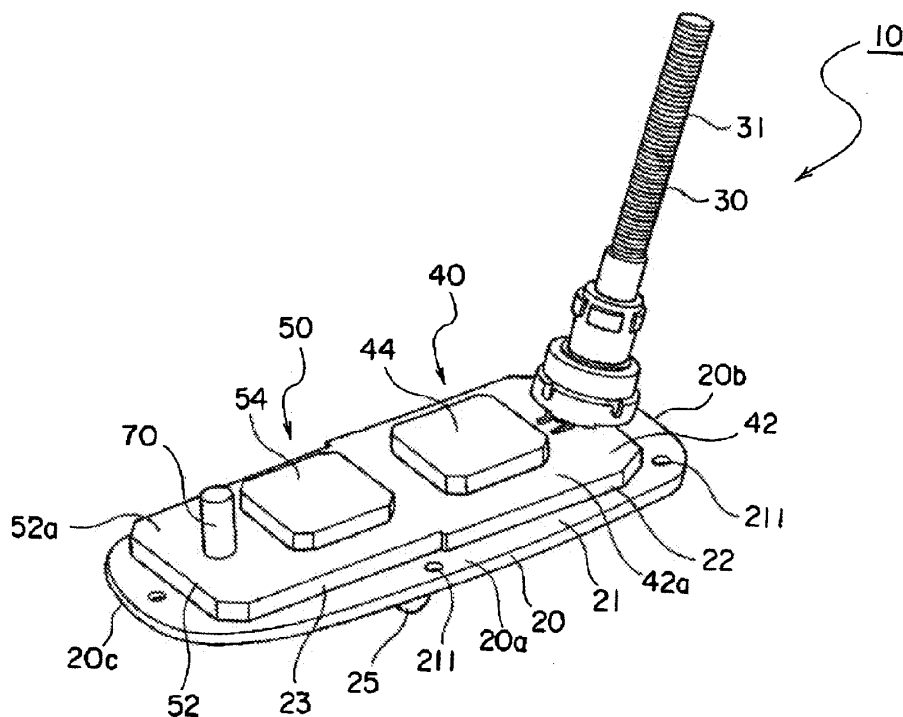
(57) **ABSTRACT**

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A complex antenna device includes: an antenna base having a main surface and first and second ends opposed to each other; a bar antenna including a metal body and disposed upright on a side of the first end of the antenna base; at least one planar antenna mounted on the main surface of the antenna base between the first and second ends of the antenna base; a metallic member provided on a side of the second end of the antenna base so as to substantially remove physical influence of the bar antenna on the planar antenna.

(21) Appl. No.: 11/829,337

(22) Filed: Jul. 27, 2007





US 20080055173A1

(19) **United States**

(12) **Patent Application Publication**  
**Chominski**

(10) **Pub. No.: US 2008/0055173 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **MULTI-BAND SMALL APERTURE ANTENNA**

**Publication Classification**

(75) **Inventor:** Michael Chominski, Carlsbad, CA (US)

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

(52) **U.S. Cl.** ..... 343/741; 343/744

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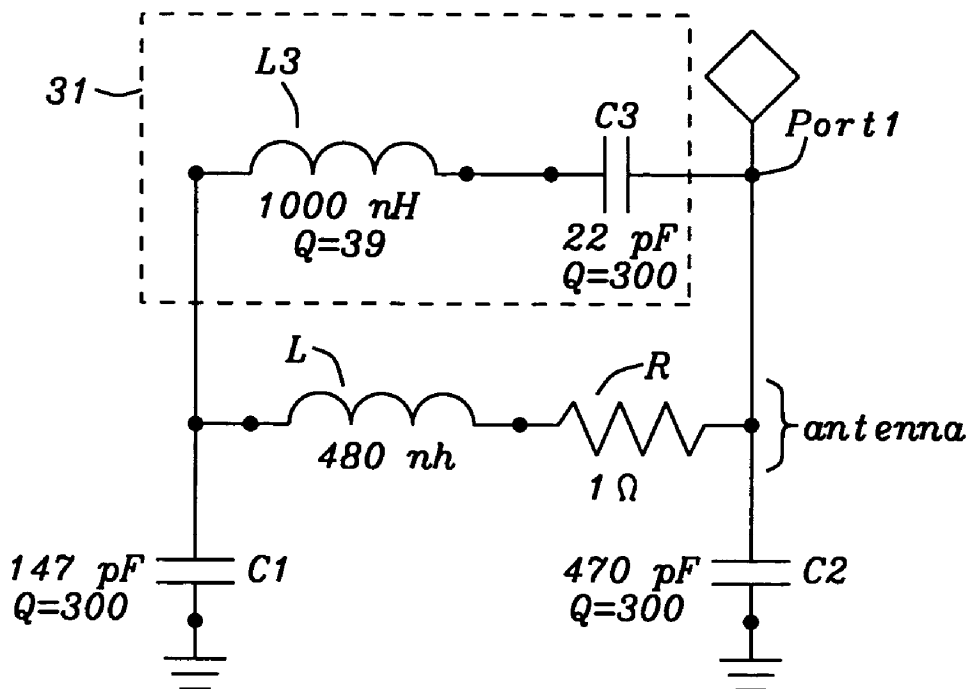
(57) **ABSTRACT**

Described is the transformation of a mono-band antenna into a or multi-band antenna by adding matching circuits, in either serial or parallel fashion, to a mono-band antenna. The matching circuits contain reactive elements such as inductors and capacitors which create impedance matching for two or more frequency bands. These multi-band loop antennas can be used for frequencies extending from a few megahertz to several hundred megahertz. The method of tuning such multi-band antennas is also described.

(73) **Assignee:** Jaalaa, Inc.

(21) **Appl. No.:** 11/514,591

(22) **Filed:** Sep. 1, 2006





US 20080055174A1

(19) **United States**

(12) **Patent Application Publication**  
**Boyle**

(10) **Pub. No.: US 2008/0055174 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **TUNING IMPROVEMENTS IN  
"INVERTED-L" PLANAR ANTENNAS**

**Publication Classification**

(75) Inventor: **Kevin R. Boyle, Horsham (GB)**

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

(52) **U.S. Cl.** ..... **343/745; 343/700 MS**

Correspondence Address:  
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(57) **ABSTRACT**

(73) Assignee: **Koninklijke Philips Electronics  
N.V.**

A communications apparatus, such as a portable radiotelephone, comprises a housing (40) containing a printed circuit board (PCB) (12) having a ground plane (16) and electronic components in rf shields (18) thereon. A planar antenna (10), for example a planar inverted-L antenna (PILA), is mounted spaced from the ground plane and a dielectric (14), for example, air, is present in a space between the PCB and the planar antenna. A feed (36) couples the planar antenna (10) to the rf components. The feed comprises parallel L-C resonator circuit components (42), a transmission line, or any other predominantly reactive network for reactively tuning the antenna. In the case of a dual band antenna the components are selected so that a lower frequency is tuned inductively and a higher frequency is tuned capacitively. The components, which may be discrete or distributed, are mounted on the PCB or a part of the planar antenna structure which is not subject to detuning by the user in normal operation of the apparatus.

(21) Appl. No.: **10/565,928**

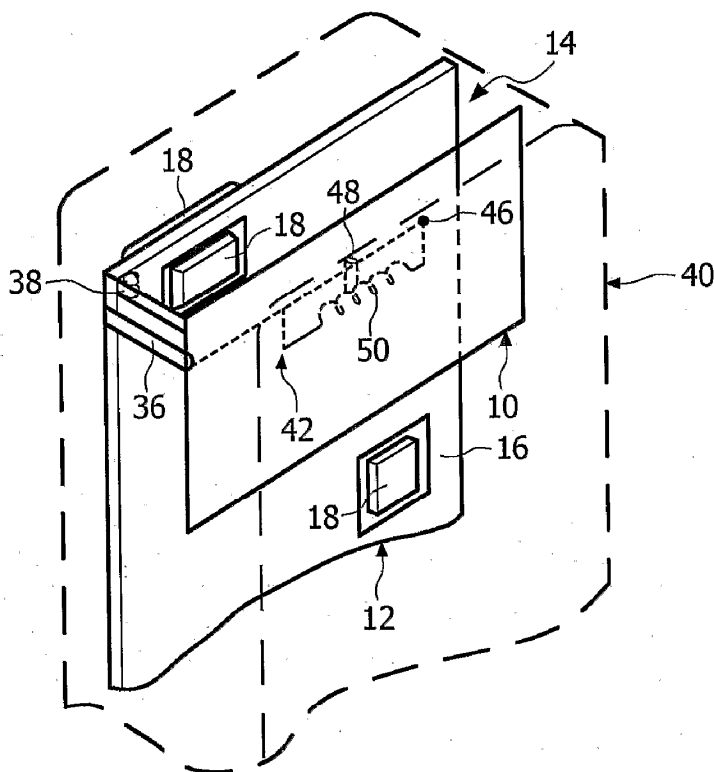
(22) PCT Filed: **Jul. 16, 2004**

(86) PCT No.: **PCT/IB04/02369**

§ 371 (c)(1),  
(2), (4) Date: **Jan. 20, 2006**

(30) **Foreign Application Priority Data**

Jul. 24, 2003 (GB) ..... 0317305.1





US 20080055175A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0055175 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **MULTI-BEAM ANTENNA**

(76) Inventors: **Gabriel REBEIZ**, La Jolla, CA (US);  
**James P. EBLING**, Ann Arbor, MI (US); **Bernhard SCHOENLINNER**,  
Trostberg (DE)

(60) Provisional application No. 60/521,284, filed on Mar. 26, 2004. Provisional application No. 60/522,077, filed on Aug. 11, 2004. Provisional application No. 60/522,077, filed on Aug. 11, 2004. Provisional application No. 60/166,231, filed on Nov. 18, 1999.

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**Publication Classification**

(51) **Int. Cl.**  
**H01Q 3/24** (2006.01)  
**H01Q 19/06** (2006.01)  
(52) **U.S. Cl.** ..... **343/754**

(21) Appl. No.: **11/929,791**

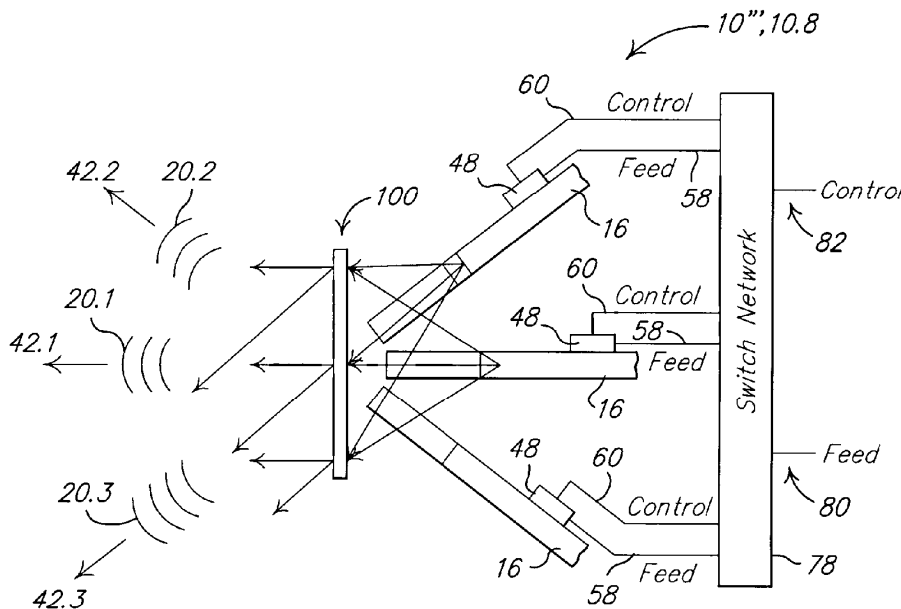
(22) Filed: **Oct. 30, 2007**

(57) **ABSTRACT**

**Related U.S. Application Data**

(63) Continuation of application No. 11/627,369, filed on Jan. 25, 2007, which is a continuation-in-part of application No. 10/907,305, filed on Mar. 28, 2005, now abandoned. Said application No. 11/627,369 is a continuation-in-part of application No. 11/161,681, filed on Aug. 11, 2005, and which is a continuation-in-part of application No. 10/604,716, filed on Aug. 12, 2003, now Pat. No. 7,042,420, which is a continuation-in-part of application No. 10/202,242, filed on Jul. 23, 2002, now Pat. No. 6,606,077, which is a continuation-in-part of application No. 09/716,736, filed on Nov. 20, 2000, now Pat. No. 6,424,319.

A plurality of antenna elements on a dielectric substrate are adapted to launch or receive electromagnetic waves in or from a direction substantially away from either a convex or concave edge of the dielectric substrate, wherein at least two of the antenna elements operate in different directions. Slotlines of tapered-slot endfire antennas in a first conductive layer of a first side of the dielectric substrate are coupled to microstrip lines of a second conductive layer on the second side of the dielectric substrate. A bi-conical reflector, conformal cylindrical dielectric lens, or discrete lens array improves the H-plane radiation pattern. Dipole or Yagi-Uda antenna elements on the conductive layer of the dielectric substrate can be used in cooperation with associated reflective elements, either alone or in combination with a corner-reflector of conductive plates attached to the conductive layers proximate to the endfire antenna elements.





US 20080055176A1

(19) **United States**

(12) **Patent Application Publication**

**BAE et al.**

(10) **Pub. No.: US 2008/0055176 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **BROADBAND ANTENNA**

(30) **Foreign Application Priority Data**

(75) Inventors: **Seok BAE**, Gyeonggi-Do (KR); **In Young Kim**, Gyeonggi-do (KR)

Aug. 30, 2006 (KR) ..... 10-2006-83106

**Publication Classification**

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(51) **Int. Cl.**  
**H01Q 11/06** (2006.01)  
**H01Q 1/00** (2006.01)  
**H01Q 11/10** (2006.01)

(52) **U.S. Cl.** ..... **343/787; 343/700 MS; 343/792.5**

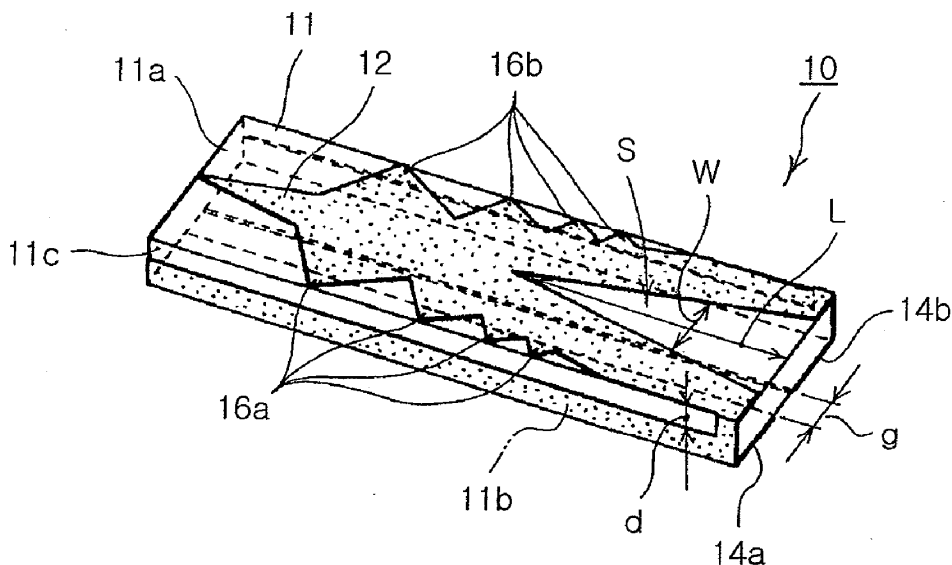
(57) **ABSTRACT**

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

There is provided a broadband antenna including: an insulating block having opposing first and second main surfaces and a side surface between the first and second main surfaces; a first radiator pattern formed on the first main surface and having a tapered slot with an open end; and a second radiator pattern including two patterns connected to opposing ends of the first radiator pattern, respectively, and extending to the second main surface.

(21) Appl. No.: **11/846,868**

(22) Filed: **Aug. 29, 2007**





US 20080055177A1

(19) **United States**

(12) **Patent Application Publication**  
**Dixon**

(10) **Pub. No.: US 2008/0055177 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **COMBINED SOLAR PANEL AND ANTENNA**

**Publication Classification**

(76) Inventor: **Glenn B. Dixon**, West Point, UT  
(US)

(51) **Int. Cl.**  
*H01Q 9/04* (2006.01)  
*H01Q 1/00* (2006.01)  
*H01Q 1/38* (2006.01)

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

(21) Appl. No.: **11/847,204**

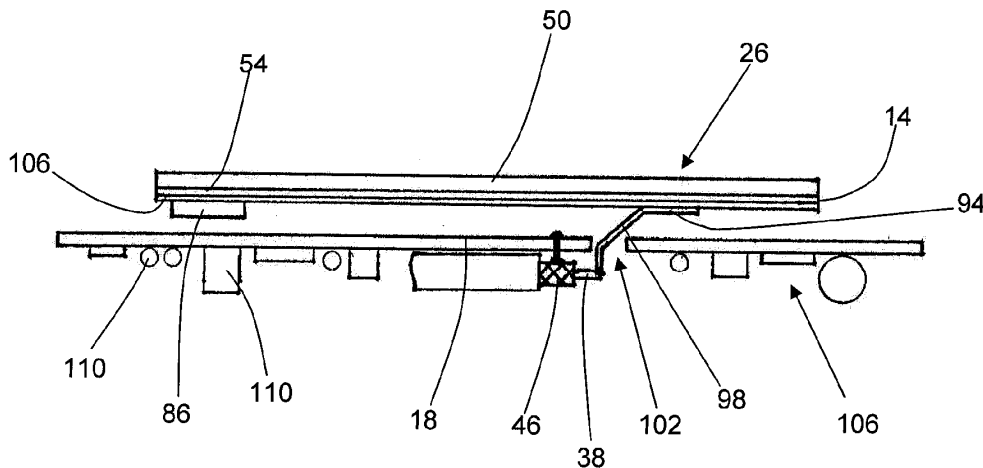
(57) **ABSTRACT**

(22) Filed: **Aug. 29, 2007**

A solar panel may be modified to function both as a solar panel and as a patch antenna. The use of combination solar cell and patch antenna allows for a greater amount of the upper surface of a device to be covered with solar panels, and may reduce the size and cost of the device. The ground layer of a printed circuit board in the device may be used as the ground plane of the patch antenna, further reducing the size and cost of the device.

**Related U.S. Application Data**

(60) Provisional application No. 60/841,434, filed on Aug. 31, 2006.





US 20080055178A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0055178 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **BROAD BAND ANTENNA**

(30) **Foreign Application Priority Data**

(75) Inventors: **In Young KIM**, Gyunggi-do (KR);  
**Seok Bae**, Gyunggi-do (KR)

Sep. 4, 2006 (KR)..... 10-2006-84698

**Publication Classification**

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**1700 DIAGONAL ROAD**  
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**ALEXANDRIA, VA 22314 (US)**

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

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

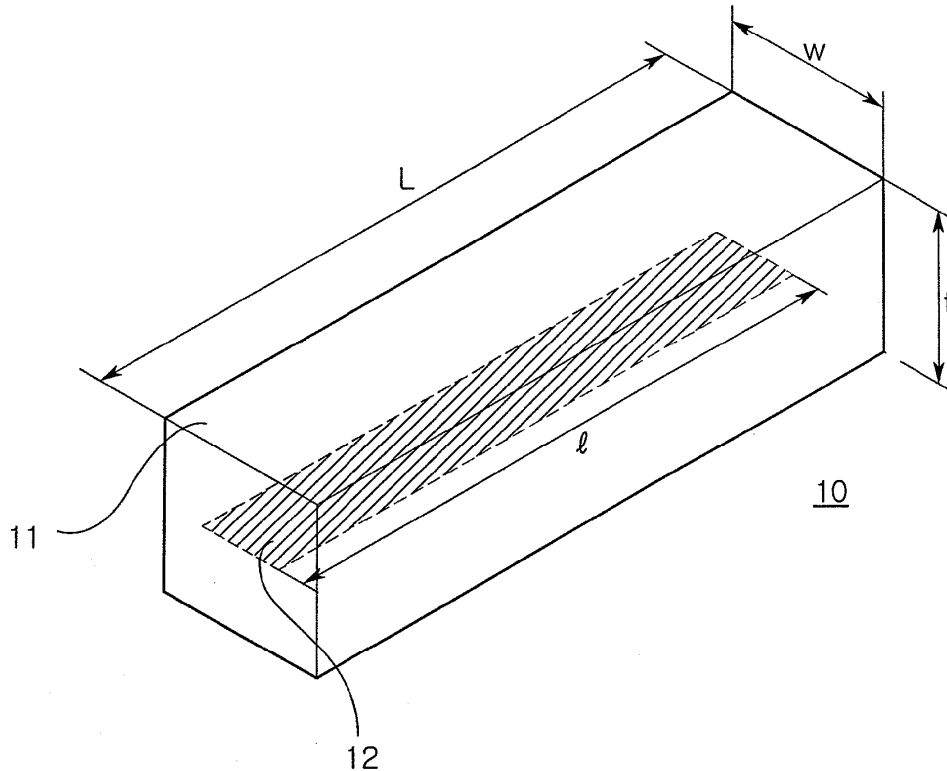
(57) **ABSTRACT**

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

A broad band antenna including: a body formed of a material having a relative permittivity of 2 to 20, a relative permeability of 1 to 10, and a magnetic loss tangent of 0.001 to 0.2, at a usable frequency; and at least one radiator disposed on the body. The material forming the body may be a composite material formed of a polymer resin mixed with a magnetic powder. The composite material may contain the magnetic powder by 90 wt % with respect to a total weight.

(21) Appl. No.: **11/848,862**

(22) Filed: **Aug. 31, 2007**







US 20080055179A1

(19) **United States**

(12) **Patent Application Publication**  
**Tao**

(10) **Pub. No.: US 2008/0055179 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **FLAT ANTENNA**

**Publication Classification**

(75) Inventor: **Wen-Szu Tao**, Hsinchu City (TW)

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

(52) **U.S. Cl.** ..... **343/795; 343/700 MS**

Correspondence Address:

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**PO BOX 747**  
**FALLS CHURCH, VA 22040-0747**

(57) **ABSTRACT**

A flat antenna includes a substrate, a first antenna module having a first grounding unit, a first radiating unit, a first feeding unit and a second radiating unit, and a second antenna module having a second grounding unit, a third radiating unit, a second feeding unit and a fourth radiating unit. The second antenna module is disposed abreast with the first antenna module. The first and the second grounding units, and the first and the third radiating units are disposed on a first surface of the substrate. The first and the second feeding units, and the second and the fourth radiating units are disposed on a second surface of the substrate. The first, the second, the third and the fourth radiating units, which have a first, a second, a third and a fourth openings respectively, are electrically connected with the first grounding unit, the first feeding unit, the second grounding unit and the second feeding unit.

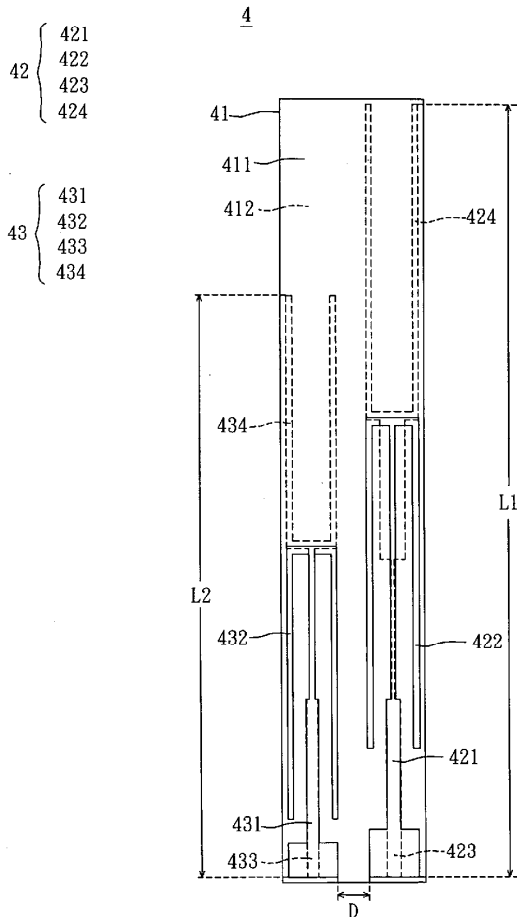
(73) Assignee: **Arcadyan Tecnology Corporation**

(21) Appl. No.: **11/517,291**

(22) Filed: **Sep. 8, 2006**

(30) **Foreign Application Priority Data**

Sep. 4, 2006 (TW) ..... 095132637





US 20080055180A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0055180 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **ANTENNA APPARATUS**

**Publication Classification**

(75) Inventors: **Junichi Noro**, Akita-shi (JP);  
**Takao Kato**, Oga-shi (JP)

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

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

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**FRISHAUF, HOLTZ, GOODMAN & CHICK, PC**  
**220 Fifth Avenue, 16TH Floor**  
**NEW YORK, NY 10001-7708**

(57) **ABSTRACT**

Disclosed is an antenna apparatus including: an antenna element including a receiving unit to receive an electric wave; a circuit substrate including a circuit surface on which a circuit amplifying an input from the antenna element is formed; a shield cover covering the circuit surface to shield the circuit substrate from a disturbing wave, the shield cover being grounded; a coaxial cable to supply driving power and GND potential to the circuit, and to output a signal from the circuit, the coaxial cable inserted into the shield cover, wherein the shield cover includes a base surface disposed in parallel with the circuit surface and a tongue flap extending to the coaxial cable, and the tongue flap includes a connecting piece formed by bending an end of the tongue flap at a side of the coaxial cable, the connecting piece being soldered to an outer conductor of the coaxial cable.

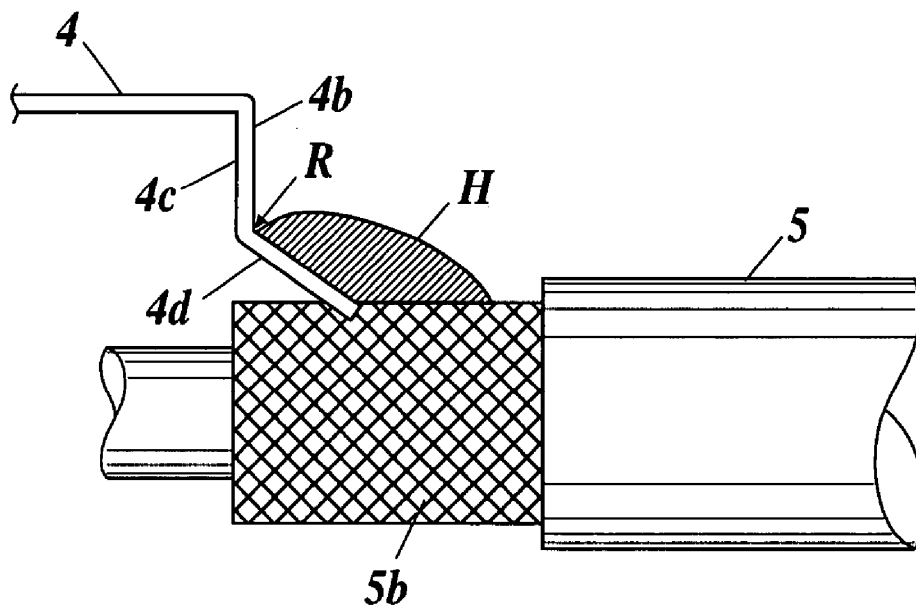
(73) Assignee: **Mitsumi Electric Co. Ltd.**,  
Tama-shi (JP)

(21) Appl. No.: **11/881,084**

(22) Filed: **Jul. 25, 2007**

(30) **Foreign Application Priority Data**

Sep. 4, 2006 (JP) ..... 2006-239053





US 20080055181A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0055181 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **RESONANT CIRCUIT, FILTER CIRCUIT,  
AND ANTENNA DEVICE**

(30) **Foreign Application Priority Data**

May 24, 2006 (JP) ..... 2006-143602

(75) Inventors: **Tamio Kawaguchi**, Kawasaki-Shi (JP);  
**Fumihiko Aiga**, Yokohama-Shi (JP);  
**Hiroyuki Kayano**, Fujisawa-Shi (JP);  
**Noritsugu Shiokawa**, Yokohama-Shi  
(JP); **Tatsunori Hashimoto**,  
Yokohama-Shi (JP)

**Publication Classification**

(51) **Int. Cl.**  
**H01Q 1/52** (2006.01)  
**H01P 1/203** (2006.01)  
**H01P 7/08** (2006.01)  
(52) **U.S. Cl.** ..... **343/850; 333/204; 505/210**

Correspondence Address:  
**OBLON, SPIVAK, MCCLELLAND MAIER &  
NEUSTADT, P.C.**  
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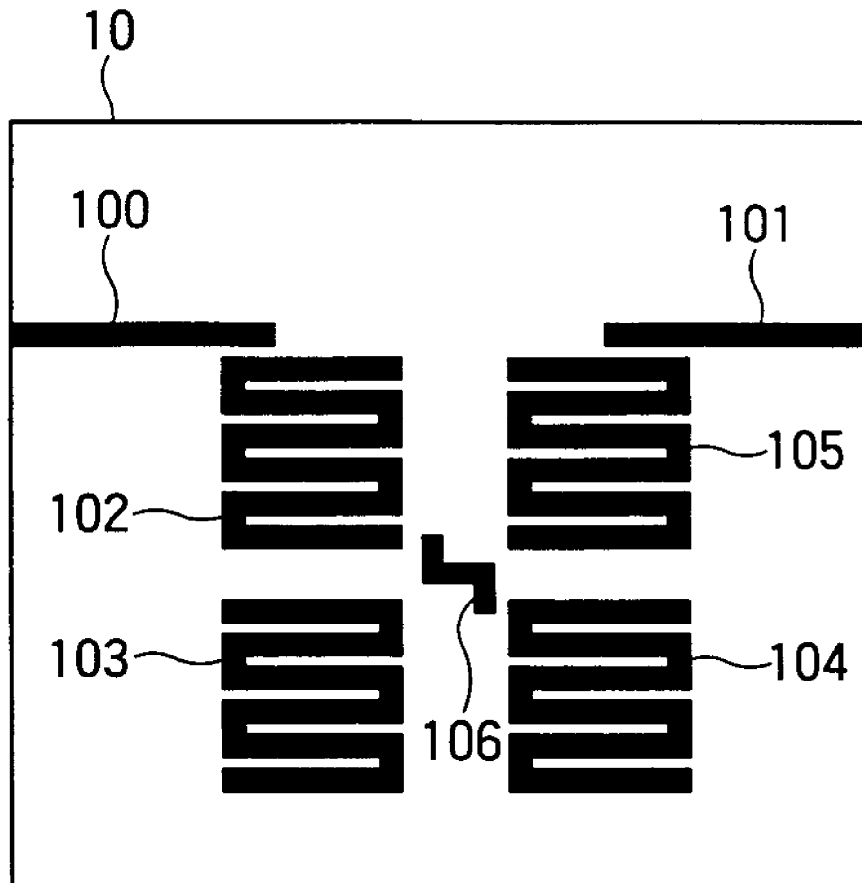
(57) **ABSTRACT**

In resonant elements **102** to **105** constituting a resonant circuit, an uncontrolled cross coupling which exists between two resonant elements is controlled by using a coupling element **106** which is newly arranged between the resonant elements, whereby it is possible to create a state where two resonant elements are not coupled with each other or a state where the amount of the coupling is reduced, which states are difficult to be realized on a plane. As a result, it is possible to improve characteristics of a planar filter.

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

(21) Appl. No.: **11/751,208**

(22) Filed: **May 21, 2007**





US 20080055182A1

(19) **United States**

(12) **Patent Application Publication**  
**LEE**

(10) **Pub. No.: US 2008/0055182 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **INNER ANTENNA USING BALUN FOR MOBILE TERMINAL**

**Publication Classification**

(75) Inventor: **Jong-In LEE**, Hwaseong-si (KR)

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

(52) **U.S. Cl.** ..... **343/859**

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**UNIONDALE, NY 11553**

(57) **ABSTRACT**

An inner antenna of a mobile terminal using a balance-to-unbalance transformer (BALUN) that can expand a frequency bandwidth is provided. The inner antenna includes a radiation plate disposed at the surface of a wiring substrate provided within the main body of a mobile terminal and has a structure in which a BALUN chip is located between a ground pad to which the radiation plate is coupled and a duplexer. Because the BALUN performs the function of a transformer, the BALUN can slowly change impedance, whereby performance deterioration due to abrupt impedance change is reduced. Slow impedance change allows a slow rate of change of the impedance locus in a frequency, thereby expanding the bandwidth of the inner antenna.

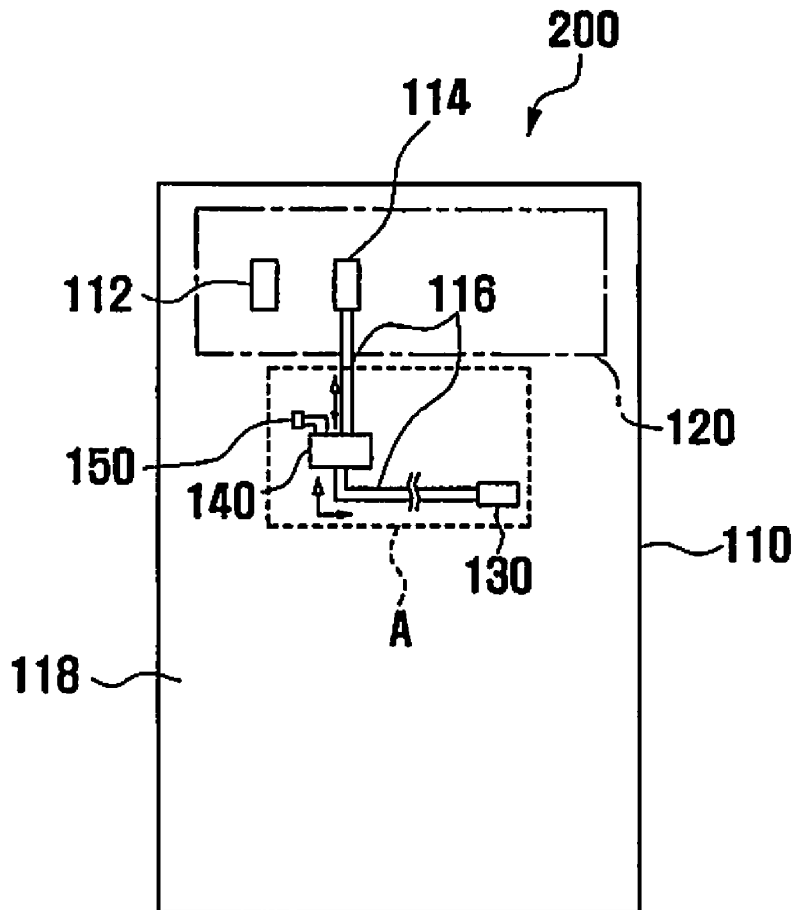
(73) Assignee: **SAMSUNG ELECTRONICS CO., LTD.**, Suwon-si (KR)

(21) Appl. No.: **11/838,562**

(22) Filed: **Aug. 14, 2007**

(30) **Foreign Application Priority Data**

Aug. 29, 2006 (KR) ..... 2006-82150





US 20080055183A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0055183 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **ANTENNA APPARATUS**

Aug. 31, 2006 (JP) ..... 2006-235536

Mar. 29, 2007 (JP) ..... 2007-088780

(75) Inventors: **Takashi Yuba**, Shinagawa (JP);  
**Shigemi Kurashima**, Shinagawa  
(JP); **Hideki Iwata**, Shinagawa  
(JP); **Masahiro Yanagi**, Shinagawa  
(JP); **Takashi Arita**, Shinagawa  
(JP); **Toshihiro Kusagaya**,  
Shinagawa (JP); **Kazuhiko Ikeda**,  
Iiyama (JP); **Hiroshi Matsumiya**,  
Iiyama (JP); **Kazuo Nomura**,  
Iiyama (JP)

**Publication Classification**

(51) **Int. Cl.**  
**H01Q 1/38** (2006.01)  
**H01P 11/00** (2006.01)  
**H01Q 1/42** (2006.01)

(52) **U.S. Cl.** ..... **343/872; 29/600**

(57) **ABSTRACT**

An antenna apparatus is disclosed that includes a synthetic resin case having an antenna element accommodating portion and a ground element accommodating portion, an antenna element made of punched sheet metal that is accommodated within the antenna element accommodating portion, a ground element made of punched sheet metal that is accommodated within the ground element accommodating portion and aligned with the antenna element, a surface mount coaxial connector that is mounted over an interface between the antenna element and the ground element, and a cover that covers the antenna element and the ground element.

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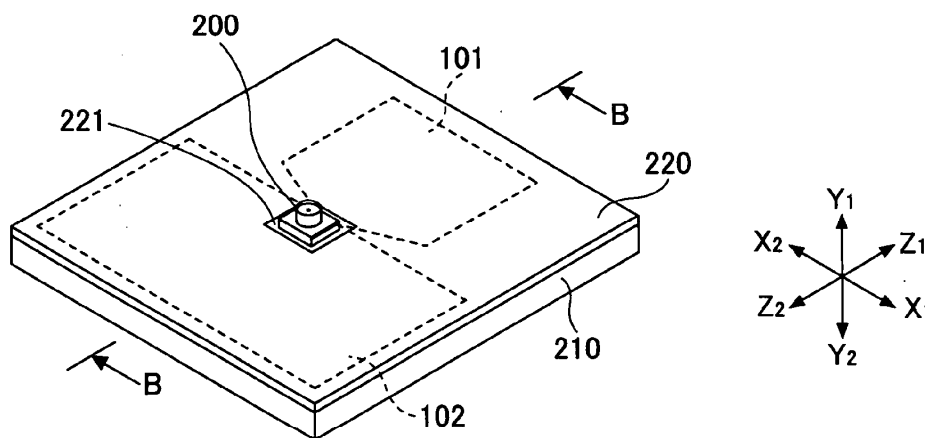
(73) Assignee: **FUJITSU COMPONENT LIMITED**, Tokyo (JP)

(21) Appl. No.: **11/802,903**

(22) Filed: **May 25, 2007**

(30) **Foreign Application Priority Data**

100





US 20080056520A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0056520 A1**

(43) **Pub. Date: Mar. 6, 2008**

(54) **HEARING AID WITH ANTENNA FOR RECEPTION AND TRANSMISSION OF ELECTROMAGNETIC SIGNALS**

(30) **Foreign Application Priority Data**

Feb. 19, 2004 (DK) ..... PA 2004-00259

(75) Inventors: **Kare T. Christensen, Smorum (DK); Ove Knudsen, Smorum (DK)**

**Publication Classification**

(51) **Int. Cl.**  
**H01Q 1/22** (2006.01)  
**H04R 25/00** (2006.01)

(52) **U.S. Cl.** ..... **381/323; 343/866; 343/884**

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**BIRCH STEWART KOLASCH & BIRCH  
PO BOX 747  
FALLS CHURCH, VA 22040-0747**

(57) **ABSTRACT**

The invention regards a communication device which is adapted for placement in a users ear. The communication device comprises a shell part enclosing an input transducer for receiving an input signal, a signal processing device and an output transducer for providing a signal perceivable as sound, a battery located at a surface part of the shell which is facing away from the head of the user, a transmission and reception circuit for transmission and/or reception of electromagnetic energy. According to the invention an antenna for radiating and/or receiving electromagnetic energy is provided such that it has a first surface turned towards the surroundings and a second surface located in close proximity of the battery.

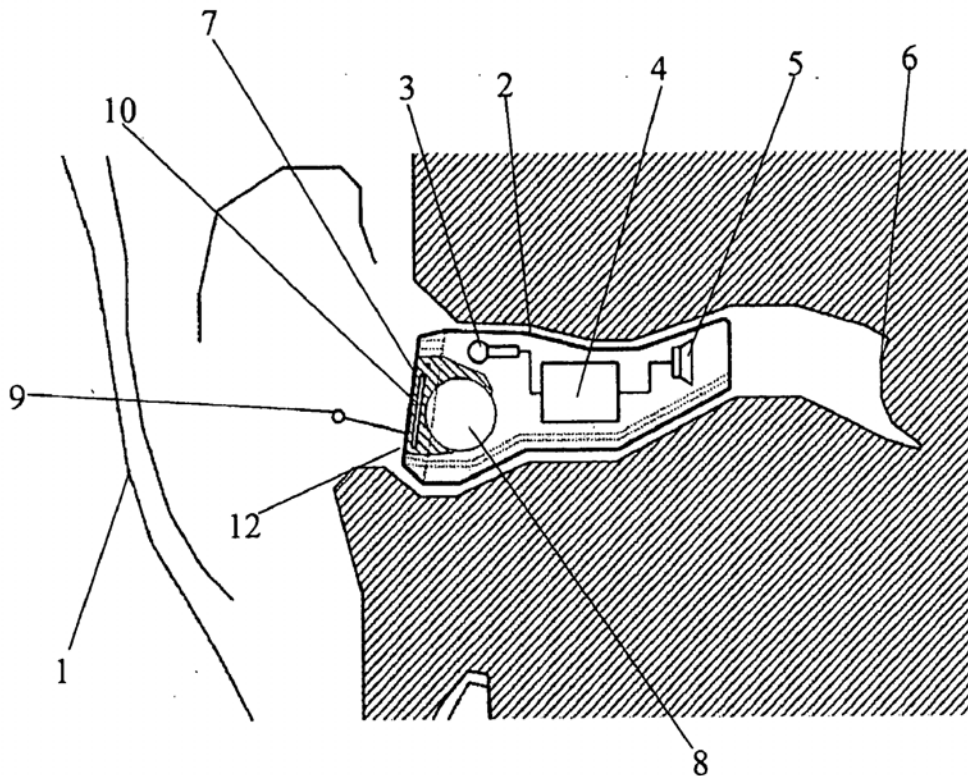
(73) Assignee: **OTICON A/S, Hellerup (DK)**

(21) Appl. No.: **10/589,759**

(22) PCT Filed: **Feb. 16, 2005**

(86) PCT No.: **PCT/DK05/00100**

§ 371 (c)(1),  
(2), (4) Date: **Jul. 13, 2007**





US 20080062044A1

(19) **United States**

(12) **Patent Application Publication**  
**Al-Mahdawi**

(10) **Pub. No.: US 2008/0062044 A1**

(43) **Pub. Date: Mar. 13, 2008**

(54) **RFID DEVICE WITH MICROSTRIP ANTENNAS**

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

(57) **ABSTRACT**

(76) **Inventor: Tareef Ibrahim Al-Mahdawi, San Jose, CA (US)**

A Radio Frequency Identification (RFID) device such as an RFID tag according to one embodiment of the present invention includes first and second sides. A first microstrip antenna extends along the first side, the first microstrip antenna comprising a microstrip positioned towards the first side, a Radio Frequency—(RF-)reflective back plane, and a dielectric spacer positioned between the microstrip and the back plane. A second microstrip antenna extends along the second side, the second microstrip antenna comprising a microstrip positioned towards the second side, an RF-reflective back plane, and a dielectric spacer positioned between the microstrip and the back plane. The first and second microstrip antennas are each independently coupled to circuitry for receiving signals from the first and second microstrip antennas.

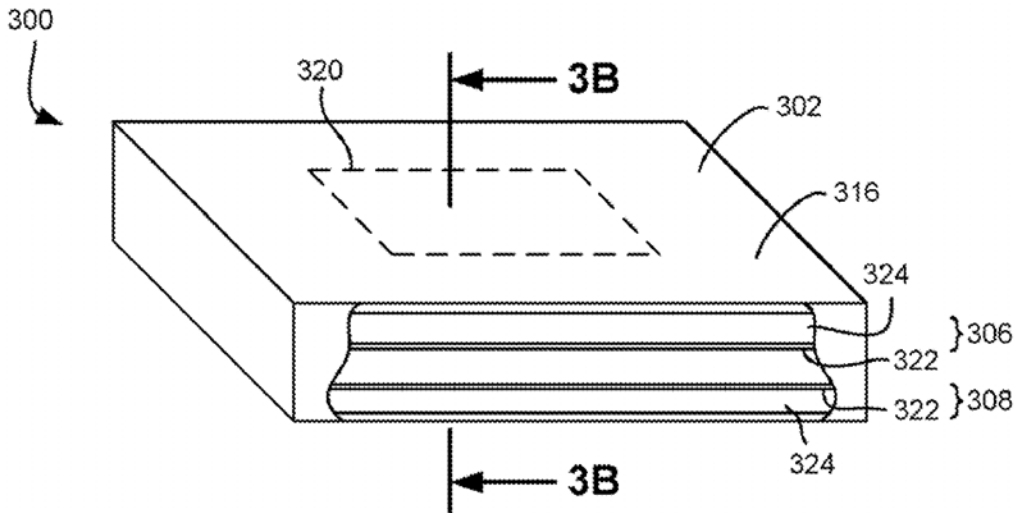
Correspondence Address:  
**Zilka-Kotab, PC**  
**P.O. BOX 721120**  
**SAN JOSE, CA 95172-1120**

(21) **Appl. No.: 11/470,968**

(22) **Filed: Sep. 7, 2006**

**Publication Classification**

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





US 20080062045A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0062045 A1**

(43) **Pub. Date: Mar. 13, 2008**

(54) **COMMUNICATION DEVICE WITH A LOW PROFILE ANTENNA**

**Publication Classification**

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

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

(57) **ABSTRACT**

(75) **Inventors:** **Carlo Dinallo**, Plantation, FL (US); **Giorgi Bit-Babik**, Sunrise, FL (US); **Paul Morningstar**, North Lauderdale, FL (US)

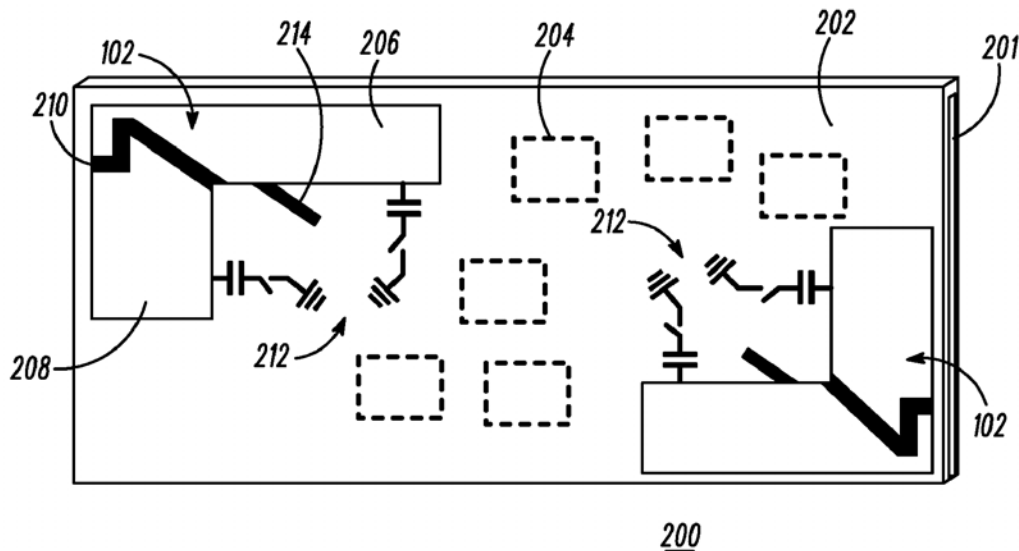
**Correspondence Address:**  
**MOTOROLA, INC.**  
**1303 EAST ALGONQUIN ROAD, IL01/3RD**  
**SCHAUMBURG, IL 60196**

An apparatus is disclosed for a communication device (100) with a low profile antenna (102). An apparatus that incorporates teachings of the present invention may include, for example, a communication device having an antenna coupled to a communication circuit, and a controller that manages operations thereof. The antenna can have a ground structure (201), an active conductor (206) supported on the ground structure by a first insulating spacer (410), a parasitic conductor (208) supported on the ground structure by a second insulating spacer (410), a first slot (210) between the active and parasitic conductors forming a coupling region, first and second conductors (404-406) coupling the ground structure to the active and parasitic conductors near the coupling region, and a signal feed conductor (214) coupling to the active conductor near the coupling region. Additional embodiments are disclosed.

(73) **Assignee:** **Motorola, Inc.**, Schaumburg, IL (US)

(21) **Appl. No.:** **11/530,255**

(22) **Filed:** **Sep. 8, 2006**







US 20080062046A1

(19) **United States**

(12) **Patent Application Publication**  
**Al-Mahdawi**

(10) **Pub. No.: US 2008/0062046 A1**

(43) **Pub. Date: Mar. 13, 2008**

(54) **MOUNTING STRUCTURE FOR MATCHING AN RF INTEGRATED CIRCUIT WITH AN ANTENNA AND RFID DEVICE IMPLEMENTING SAME**

(75) **Inventor: Tareef Ibrahim Al-Mahdawi, San Jose, CA (US)**

**Correspondence Address:**  
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**P.O. BOX 721120**  
**SAN JOSE, CA 95172-1120**

(73) **Assignee: INTELLEFLEX CORPORATION**

(21) **Appl. No.: 11/530,425**

(22) **Filed: Sep. 8, 2006**

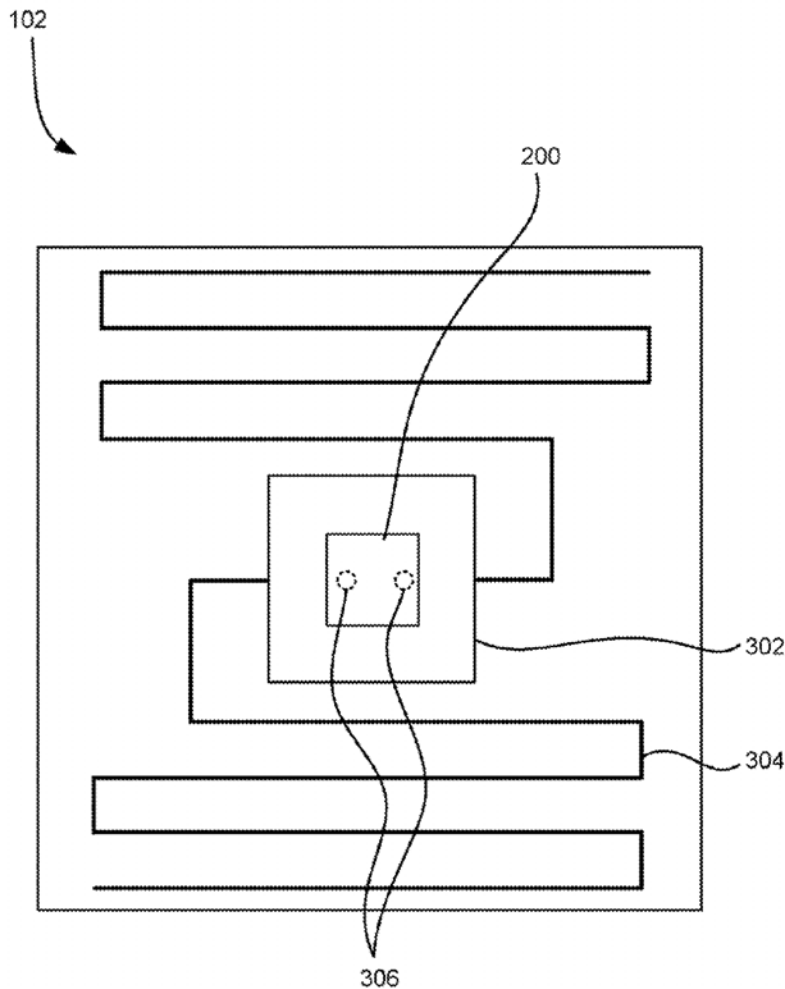
**Publication Classification**

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

(52) **U.S. Cl. .... 343/700 MS; 343/850**

(57) **ABSTRACT**

A radio frequency device such as an RFID tag according to one embodiment includes an antenna, an integrated circuit, and a structure positioned between the antenna and the integrated circuit for electrically coupling the antenna to the integrated circuit, the structure assisting in matching RF-related properties of the integrated circuit, e.g., antenna inputs thereof, and the antenna.





US 20080062047A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0062047 A1**

(43) **Pub. Date: Mar. 13, 2008**

(54) **ANTENNA DEVICE**

(30) **Foreign Application Priority Data**

(75) Inventors: **Hideki Iwata**, Shinagawa (JP);  
**Shigemi Kurashima**, Shinagawa (JP);  
**Masahiro Yanagi**, Shinagawa (JP);  
**Takashi Yuba**, Shinagawa (JP);  
**Takashi Arita**, Shinagawa (JP)

Sep. 13, 2006 (JP) ..... 2006-248631

**Publication Classification**

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

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

(57) **ABSTRACT**

An antenna device is disclosed that includes a dielectric substrate having first and second surfaces facing away from each other, an element pattern formed on the first surface of the dielectric substrate, a conductive pattern formed on the first surface of the dielectric substrate so as to extend from the feeding point of the element pattern, and a ground pattern formed on the second surface of the dielectric substrate so as to form a microstrip line in cooperation with the conductive pattern. The ground pattern has a cutout part formed in a portion thereof opposing the feeding point.

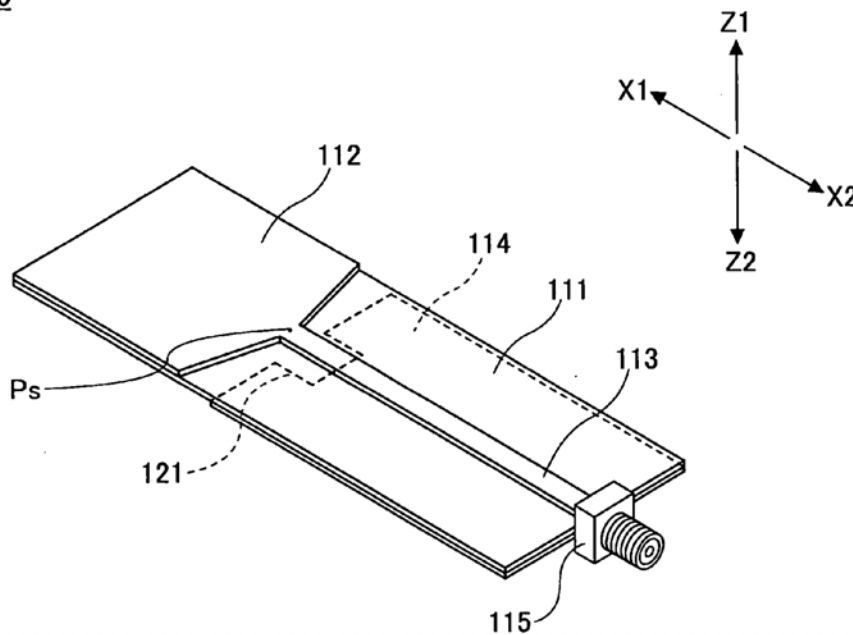
Correspondence Address:  
**STAAS & HALSEY LLP**  
**SUITE 700, 1201 NEW YORK AVENUE, N.W.**  
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(73) Assignee: **FUJITSU COMPONENT LIMITED**, Tokyo (JP)

(21) Appl. No.: **11/783,291**

(22) Filed: **Apr. 6, 2007**

100





US 20080062048A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0062048 A1**

(43) **Pub. Date: Mar. 13, 2008**

(54) **CHIP ANTENNA MODULE**

(57) **ABSTRACT**

(76) Inventors: **Cho-Kang Hsu**, Hsinchu (TW);  
**Chih-Ming Chen**, Hsinchu (TW)

A chip antenna module with two loops is disposed on a ceramic housing for receiving two different frequencies, and an adjustable matching loop is disposed on the housing for shortening the development time of the antenna module by means of adjusting the adjustable matching loop. The chip antenna module comprises a ceramic housing, a first loop, a second loop, and a matching loop. The first loop is disposed on a top surface of the housing for receiving a first frequency, the second loop is disposed on a top surface of the housing for receiving a second frequency, and the matching loop is disposed on a bottom surface of the housing for adjusting a matching impedance. In order to satisfy the system requirements of the matching impedance, a user can simply adjust the path of the matching loop via the special loop design of the matching loop.

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3458 ELLICOTT CENTER DRIVE-SUITE 101  
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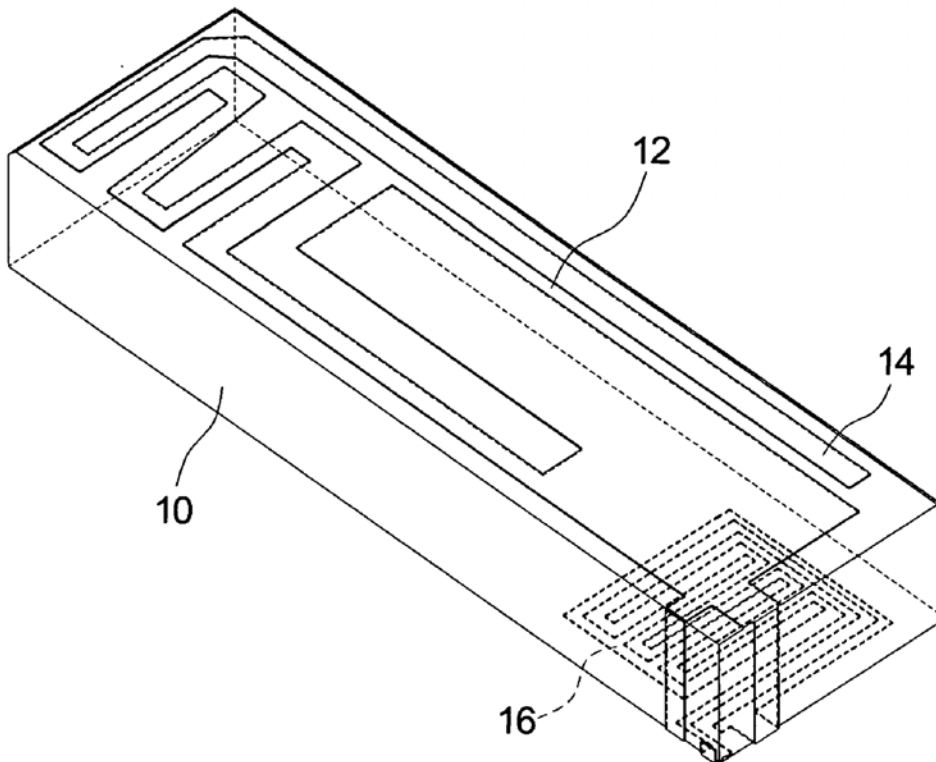
(21) Appl. No.: **11/518,239**

(22) Filed: **Sep. 11, 2006**

**Publication Classification**

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

(52) **U.S. Cl.** ..... **343/702; 343/700 MS; 343/895**





US 20080062049A1

(19) **United States**

(12) **Patent Application Publication**  
**Soler Castany et al.**

(10) **Pub. No.: US 2008/0062049 A1**

(43) **Pub. Date: Mar. 13, 2008**

(54) **TUNABLE ANTENNA**

**Related U.S. Application Data**

(75) Inventors: **Jordi Soler Castany**, Barcelona (ES);  
**Carles Puente Baliarda**, Barcelona  
(ES); **Josep Mumbro Forn**, Barcelona  
(ES)

(60) Provisional application No. 60/613,394, filed on Sep.  
27, 2004. Provisional application No. 60/640,380,  
filed on Dec. 30, 2004.

**Publication Classification**

Correspondence Address:  
**KENYON & KENYON LLP**  
**1500 K STREET N.W.**  
**SUITE 700**  
**WASHINGTON, DC 20005 (US)**

(51) **Int. Cl.**  
*H01Q 1/38* (2006.01)  
*H01Q 1/40* (2006.01)  
*H01Q 9/04* (2006.01)  
(52) **U.S. Cl.** ..... **343/702; 343/700 MS; 343/873**

(57) **ABSTRACT**

(73) Assignee: **FRACTUS, S.A.**, Sant Cugat del Vallès,  
B (ES)

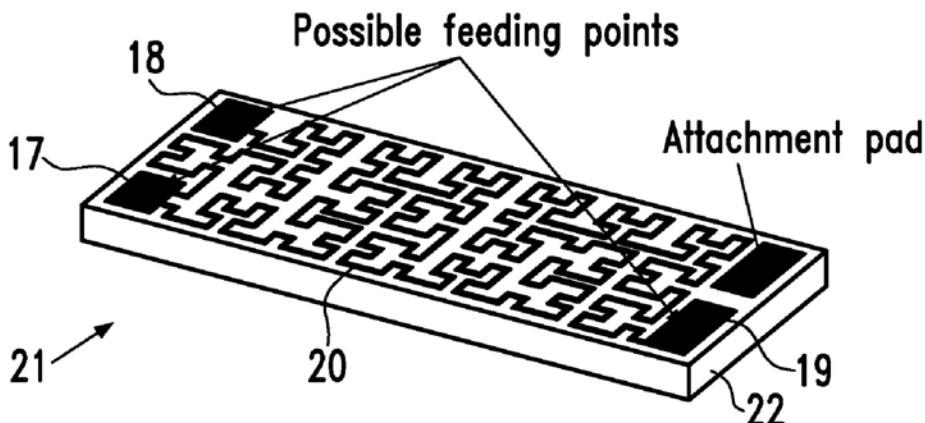
The invention refers to an antenna comprising: a conducting trace (15, 20), said conducting trace (15, 20) defining a curve (1, 4, 5, 6, 6', 6'', 8), said curve (1, 4, 5, 6, 6', 6'', 8) including two or more feeding points (16a, 16b, 16c, 17, 18, 19), a portion of said curve (1, 4, 5, 6, 6', 6'', 8) being shaped according a geometry selected from a group of geometries including a space-filling curve, a grid-dimension curve, a box-counting curve and a contour curve or the curve (1, 4, 5, 6, 6', 6'', 8) or a portion of said curve having a shape of a multilevel structure. Further the invention refers to a related SMD component, an IC-package, a wireless device and a method for contacting an antenna.

(21) Appl. No.: **11/576,015**

(22) PCT Filed: **Sep. 1, 2005**

(86) PCT No.: **PCT/EP05/54297**

§ 371(c)(1),  
(2), (4) Date: **Mar. 26, 2007**





US 20080062051A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0062051 A1**

(43) **Pub. Date: Mar. 13, 2008**

(54) **ANTENNA**

**Publication Classification**

(75) **Inventors:** **Cheul-hae Park**, Suwon-si (KR);  
**Chun-min Jung**, Seoul (KR)

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

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

Correspondence Address:  
**STEIN, MCEWEN & BUI, LLP**  
**1400 EYE STREET, NW, SUITE 300**  
**WASHINGTON, DC 20005**

(57) **ABSTRACT**

Provided is an antenna including: an antenna stick; and an antenna hinge pivotably attaching the antenna stick to an electronic device body. The antenna hinge includes: a support plate fixed to and combined with the electronic device body; a first connector connected to the antenna stick and pivotably combined with the support plate; a second connector deviating from a pivot center of the first connector and fixed in respect of the support plate; a third connector moving with the pivot of the first connector; and a spring having an elastic force varying with a distance between the second connector and the third connector. If the first connector pivots until the third connector passes a virtual first straight line connecting the pivot center of the first connector and the second connector, the first connector continuously pivots toward an identical direction due to an elastic restoring force of the spring.

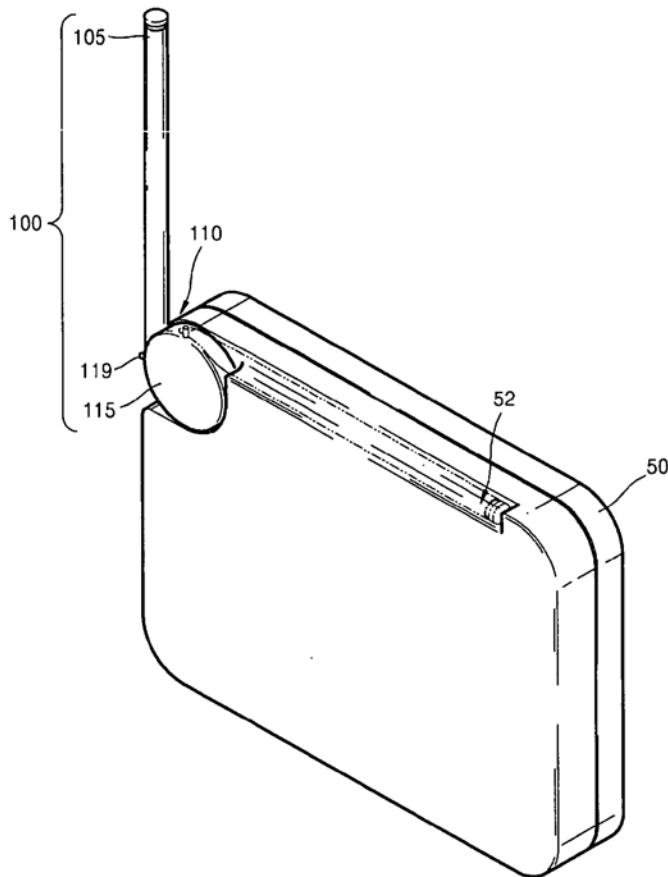
(73) **Assignee:** **Samsung Electronics Co., Ltd.**,  
Suwon-si (KR)

(21) **Appl. No.:** **11/655,874**

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

(30) **Foreign Application Priority Data**

Sep. 11, 2006 (KR) ..... 2006-87468





US 20080062054A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0062054 A1**

(43) **Pub. Date: Mar. 13, 2008**

(54) **COMPLEX ANTENNA WITH PROTECTION MEMBER**

(75) Inventors: **Yun-Long Ke**, Tu-Cheng (TW);  
**Yao-Shien Huang**, Tu-Cheng (TW);  
**Shang-Jen Chen**, Tu-Cheng (TW);  
**Chen-Ta Hung**, Tu-Cheng (TW);  
**Po-Kang Ku**, Tu-Cheng (TW)

Correspondence Address:  
**WEI TE CHUNG**  
**FOXCONN INTERNATIONAL, INC.**  
**1650 MEMOREX DRIVE**  
**SANTA CLARA, CA 95050**

(73) Assignee: **HON HAI PRECISION IND. CO., LTD.**

(21) Appl. No.: **11/900,387**

(22) Filed: **Sep. 11, 2007**

(30) **Foreign Application Priority Data**

Sep. 11, 2006 (TW) ..... 95133416

**Publication Classification**

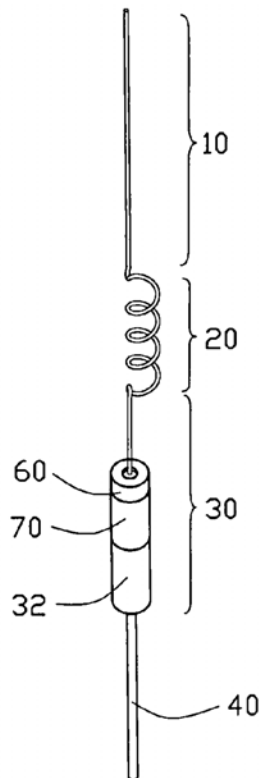
(51) **Int. Cl.**  
**H01Q 1/00** (2006.01)  
**H01Q 1/36** (2006.01)

(52) **U.S. Cl.** ..... **343/730**

(57) **ABSTRACT**

A complex antenna adapted for used in a electronic device, comprises a rod antenna, a helical antenna, a dipole antenna comprising a radiating element and a grounding element, and a feeding line. The feeding line comprises an inner conductor electrically connecting to the radiating element at a first joint position and an outer conductor electrically connecting to the grounding element at a second joint position. The first joint position is tightly covered by a insulating tubular element for avoiding to be destroyed and oxidized.

100





US 20080062060A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0062060 A1**

(43) **Pub. Date: Mar. 13, 2008**

(54) **ANTENNA AND RECEIVER HAVING THE SAME**

(76) Inventors: **Junichi NORO**, Akita (JP); **Takao KATO**, Akita (JP)

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

(21) Appl. No.: **11/829,312**

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

(30) **Foreign Application Priority Data**

Sep. 13, 2006 (JP) ..... P2006-247453  
Sep. 19, 2006 (JP) ..... P2006-252870

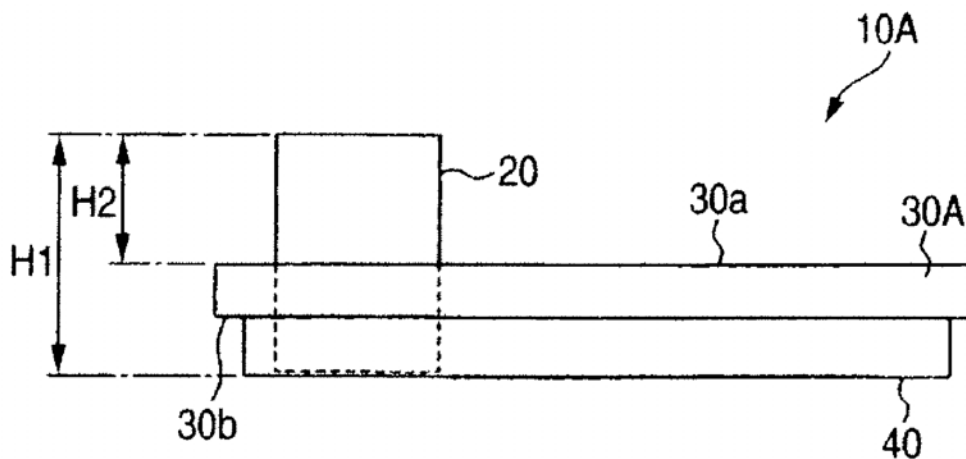
**Publication Classification**

(51) **Int. Cl.**  
*H01Q 1/52* (2006.01)  
*H01Q 1/12* (2006.01)

(52) **U.S. Cl.** ..... **343/842; 343/841; 343/878**

(57) **ABSTRACT**

A circuit board has a first face and a second face opposite to the first face. A low noise amplifier is mounted on the second face. A pole-type antenna module is extending vertically along a central axis thereof. A shield cover is attached to the second face of the circuit board so as to cover the low noise amplifier. The circuit board is formed with a through hole connecting the first face and the second face. The pole-type antenna module is inserted into the through hole so that a lower part thereof is accommodated in the shield cover and an upper part thereof is protruded from the first face of the circuit board.





US 20080062063A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0062063 A1**

(43) **Pub. Date: Mar. 13, 2008**

(54) **POLARIZATION SWITCHING/VARIABLE DIRECTIVITY ANTENNA**

**Publication Classification**

(75) Inventors: **Akio MATSUSHITA**, Osaka (JP);  
**Tomoyasu Fujishima**, Osaka (JP)

(51) **Int. Cl.**  
**H01Q 1/48** (2006.01)  
(52) **U.S. Cl.** ..... **343/846; 343/700 MS**

Correspondence Address:  
**MCDERMOTT WILL & EMERY LLP**  
**600 13TH STREET, NW**  
**WASHINGTON, DC 20005-3096 (US)**

(57) **ABSTRACT**

A polarization switching/variable directivity antenna according to the present invention includes a radiation conductor plate 12 on a front face, and a ground conductor plate 14 on a rear face, of a dielectric substrate 11. At least one directivity switching element and at least two polarization switching elements are provided within the ground conductor plate 14 on the rear face. The directivity switching element includes a first slot which is formed by a removing a loop-like portion from the ground conductor plate 14 and at least two directivity switching switches (22a to 22d). Each polarization switching element includes a first slot which is formed by removing a loop-like portion from the ground conductor plate 14 and at least one polarization switching switch (23a to 23d). Switching of a maximum gain direction of radiation directivity of the antenna is realized through control of the directivity switching switches 22a to 22d, and switching of the rotation direction of a circularly polarized wave which is emitted from the antenna is realized through control of the polarization switching switches 23a to 23d.

(73) Assignee: **MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD**, Osaka (JP)

(21) Appl. No.: **11/938,497**

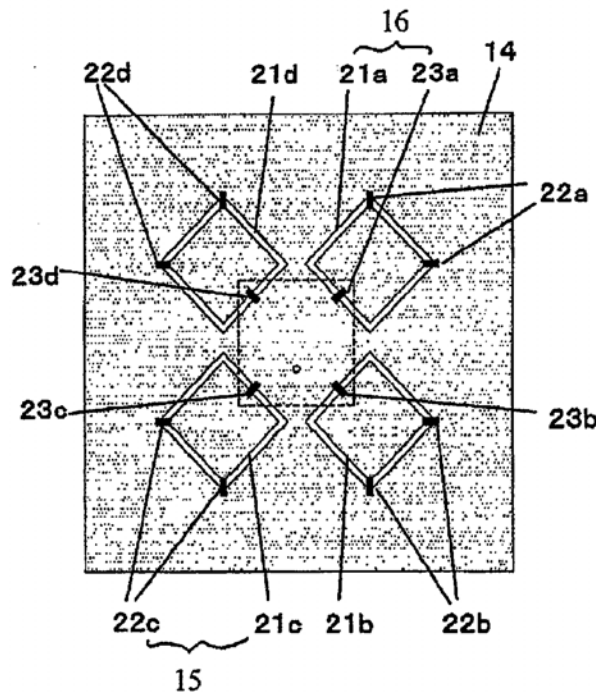
(22) Filed: **Nov. 12, 2007**

**Related U.S. Application Data**

(63) Continuation of application No. PCT/JP2007/054517, filed on Mar. 8, 2007.

(30) **Foreign Application Priority Data**

Apr. 14, 2006 (JP) ..... 2006-111756









US 20080066116A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0066116 A1**

(43) **Pub. Date: Mar. 13, 2008**

(54) **ACTIVE DIGITAL TV ANTENNA**

**Publication Classification**

(75) Inventors: **Chi-Ming Chiang**, Pa-Te City (TW); **Annie Yang**, Pa-Te City (TW); **Chih-Cheng Chien**, Pa-Te City (TW)

(51) **Int. Cl.**  
**H04N 7/20** (2006.01)

(52) **U.S. Cl.** ..... **725/72**

Correspondence Address:  
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**SUITE 1404, 5205 LEESBURG PIKE**  
**FALLS CHURCH, VA 22041**

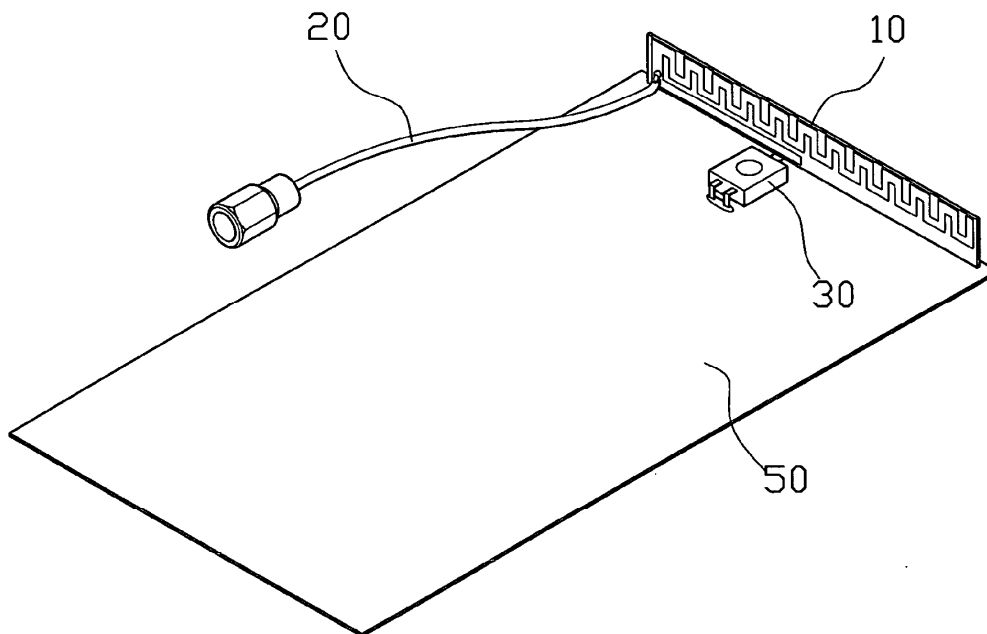
(57) **ABSTRACT**

An active digital TV antenna, the antenna mainly has a planar antenna and a variable capacitor connected to the planar antenna; the variable capacitor is used to adjust a capacitance value and an inductance value of the planar antenna to change the range of frequency band of a signal received by the planar antenna. Therefore, the entire volume of the antenna can be reduced to be suitable for applying in an active electronic machine such as a notebook or a mobile phone.

(73) Assignee: **Auden Techno Corp.**

(21) Appl. No.: **11/518,387**

(22) Filed: **Sep. 11, 2006**





US 20080067715A1

(19) **United States**

(12) **Patent Application Publication**  
**SUNG**

(10) **Pub. No.: US 2008/0067715 A1**

(43) **Pub. Date: Mar. 20, 2008**

(54) **METHOD OF MANUFACTURING CASE STRUCTURE HAVING ANTENNA**

(30) **Foreign Application Priority Data**

(75) Inventor: **Jae Suk SUNG**, Gyeonggi-do (KR)

Sep. 15, 2006 (KR) ..... 10-2006-89425  
May 10, 2007 (KR) ..... 10-2007-45576

Correspondence Address:

**LOWE HAUPTMAN HAM & BERNER, LLP**  
**1700 DIAGONAL ROAD, SUITE 300**  
**ALEXANDRIA, VA 22314**

**Publication Classification**

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

(52) **U.S. Cl.** ..... **264/279**

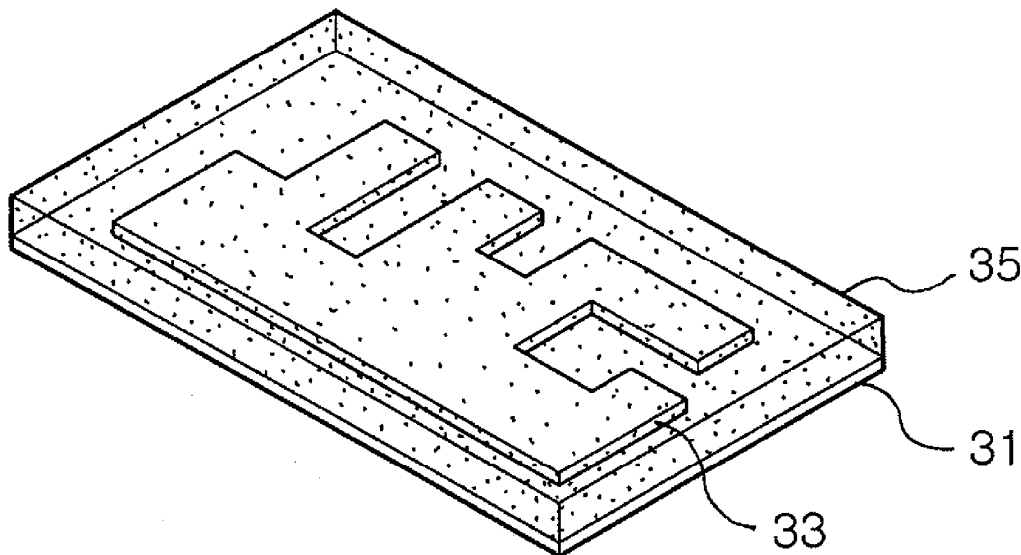
(73) Assignee: **SAMSUNG ELECTRO-MECHANICS CO., LTD.**, GYUNGGI-DO (KR)

(57) **ABSTRACT**

(21) Appl. No.: **11/855,347**

A method of manufacturing a case structure having an antenna, the method including: providing a carrier film; forming an antenna radiator formed of a metal foil on at least one surface of the carrier film; inserting the carrier film having the antenna radiator formed thereon into a mold formed in a desired shape of a case structure; and injecting a molding material into the mold.

(22) Filed: **Sep. 14, 2007**





US 20080068175A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0068175 A1**

(43) **Pub. Date: Mar. 20, 2008**

(54) **ANTENNA ARRANGEMENTS FOR RADIO  
FREQUENCY IDENTIFICATION (RFID)  
TAGS**

**Related U.S. Application Data**

(60) Provisional application No. 60/844,367, filed on Sep. 14, 2006.

(75) Inventors: **Theodore HOCKEY**, Mount Airy, MD (US); **Joseph White**, Woodbine, MD (US); **Michael Sloan**, Ellicott City, MD (US); **Hai Tran**, Aldie, VA (US); **Wayne E. Shanks**, Baltimore, MD (US)

**Publication Classification**

(51) **Int. Cl.**  
**G08B 13/14** (2006.01)  
(52) **U.S. Cl.** ..... **340/572.7**

Correspondence Address:  
**STERNE, KESSLER, GOLDSTEIN & FOX  
P.L.L.C.**  
**1100 NEW YORK AVENUE, N.W.**  
**WASHINGTON, DC 20005 (US)**

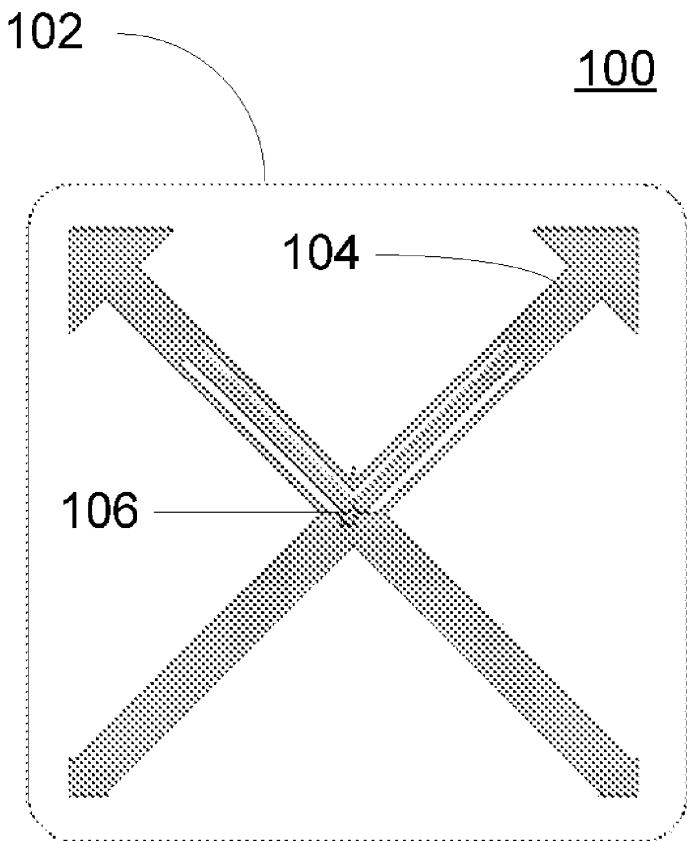
(57) **ABSTRACT**

Various antenna arrangements are disclosed for RFID tags. Embodiments of single dipole, dual dipole and patch antenna arrangements are described. Dipole antenna arrangements include metalizations used for tuning the antenna to resonance and for impedance matching to an IC with which they operate. Patch antenna arrangements have cut out portions used for tuning the antenna to resonance and for impedance matching to an IC with which they operate.

(73) Assignee: **Symbol Technologies, Inc.**, Holtsville, NY

(21) Appl. No.: **11/855,758**

(22) Filed: **Sep. 14, 2007**





US 20080068268A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0068268 A1**

(43) **Pub. Date: Mar. 20, 2008**

(54) **LOW PROFILE ANTENNA**

**Publication Classification**

(76) Inventors: **John V. Kowalewicz**, Ortonville, MI (US); **Ralf Lindackers**, Waterford, MI (US); **Andreas Fuchs**, Grand Blanc, MI (US); **Cheikh Thaim**, Orion, MI (US)

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

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

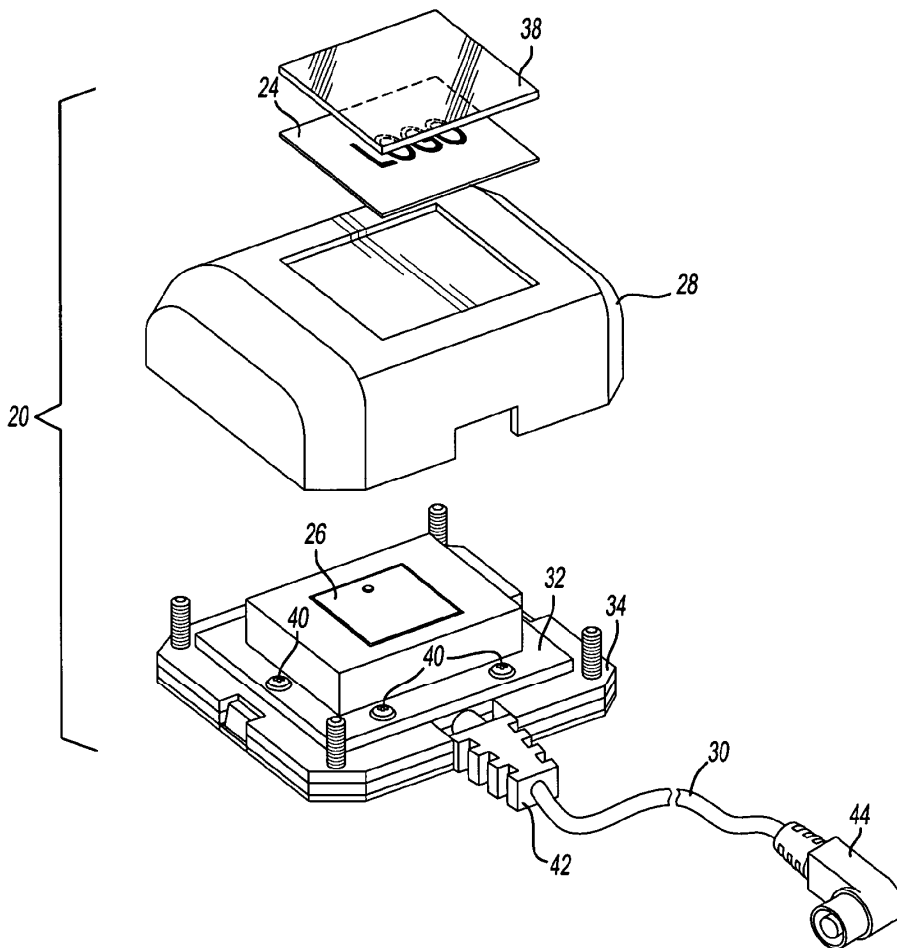
(57) **ABSTRACT**

A low-profile antenna according to exemplary embodiments generally includes a patch antenna enclosed in a housing, and a directional element for directing a direction of sensitivity for the patch antenna. The directional element is positioned on the external surface of the housing. A protective lens may be positioned over the directional element. In one exemplary embodiment, the directional element is formed from a layer of conductive material. In another exemplary embodiment, the directional element is formed from conductive ink containing silver particles.

Correspondence Address:  
**HARNESS, DICKEY, & PIERCE, P.L.C**  
**7700 BONHOMME, STE 400**  
**ST. LOUIS, MO 63105**

(21) Appl. No.: **11/521,228**

(22) Filed: **Sep. 14, 2006**







US 20080068281A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0068281 A1**

(43) **Pub. Date: Mar. 20, 2008**

(54) **BROADBAND ANTENNA**

(30) **Foreign Application Priority Data**

(75) Inventors: **Emilie Fond**, Grenoble (FR);  
**Serge Perrot**, Tullins (FR);  
**Patrice Rigoland**, Hamden, CT  
(US)

Sep. 20, 2006 (FR) ..... 06 53846

**Publication Classification**

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

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

(57) **ABSTRACT**

Correspondence Address:  
**OLIFF & BERRIDGE, PLC**  
**P.O. BOX 320850**  
**ALEXANDRIA, VA 22320-4850**

The present invention relates to an antenna comprising:

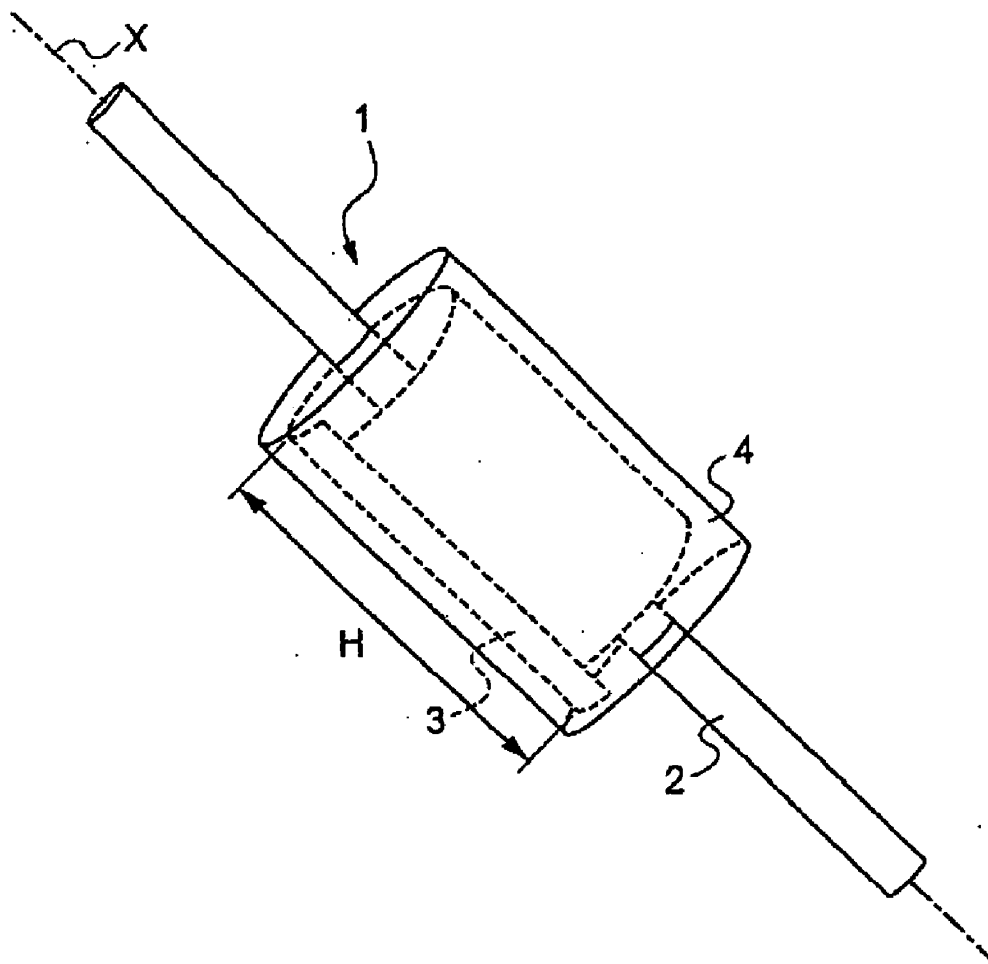
at least one central longitudinal radiating element; and

at least one outer element comprising at least one rolled-up electrically-conductive sheet disposed around the central element, without electrical contact therebetween, the outer element presenting a height that is strictly decreasing, or alternatively that increases and decreases along the roll.

(73) Assignee: **RADIALL, ROSNY SOUS BOIS**  
(FR)

(21) Appl. No.: **11/898,001**

(22) Filed: **Sep. 7, 2007**





US 20080074325A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0074325 A1**  
(43) **Pub. Date: Mar. 27, 2008**

(54) **ANTENNA APPARATUS AND METHOD FOR FABRICATING THE SAME**

(75) Inventors: **Shigemi Kurashima**, Shinagawa (JP); **Takashi Yuba**, Shinagawa (JP); **Hideki Iwata**, Shinagawa (JP); **Masahiro Yanagi**, Shinagawa (JP); **Takashi Arita**, Shinagawa (JP); **Toshihiro Kusagaya**, Shinagawa (JP)

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

(73) Assignee: **FUJITSU COMPONENT LIMITED**, Tokyo (JP)

(21) Appl. No.: **11/657,028**

(22) Filed: **Jan. 24, 2007**

(30) **Foreign Application Priority Data**

Sep. 22, 2006 (JP) ..... 2006-257782

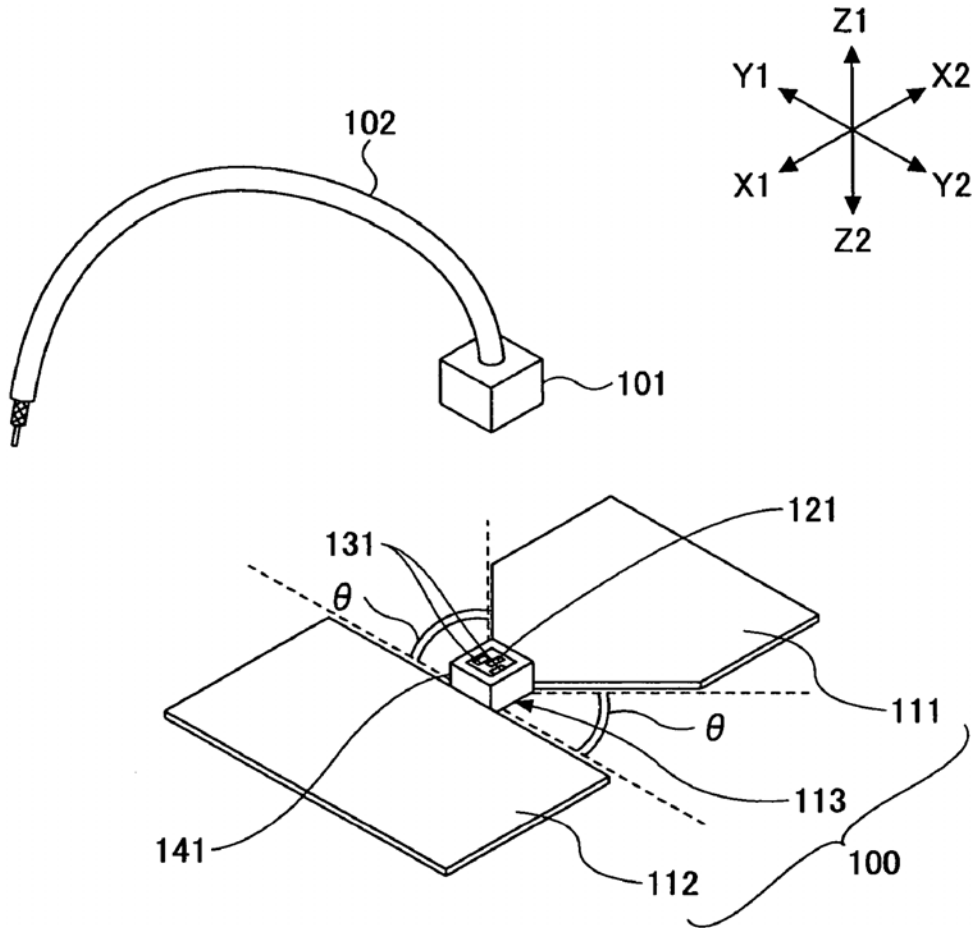
**Publication Classification**

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

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

(57) **ABSTRACT**

An antenna apparatus is disclosed that includes an element member made of sheet metal, a ground member made of sheet metal, and a connection part that is integrally formed with the element member and the ground member.







US 20080074326A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2008/0074326 A1**

**Huang et al.** (43) **Pub. Date: Mar. 27, 2008**

(54) **MINIATURIZED PLANAR ANTENNA OF DIGITAL TELEVISION**

(30) **Foreign Application Priority Data**

Jun. 23, 2006 (TW)..... 095122660

(75) Inventors: **Jiunn-Ming Huang**, Taipei Hsien  
(TW); **Chih-Lung Chen**, Taipei Hsien  
(TW); **Kuan-Hsueh Tseng**, Taipei  
Hsien (TW)

**Publication Classification**

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

Correspondence Address:  
**BRUCE H. TROXELL**  
**SUITE 1404**  
**5205 LEESBURG PIKE**  
**FALLS CHURCH, VA 22041 (US)**

(57) **ABSTRACT**

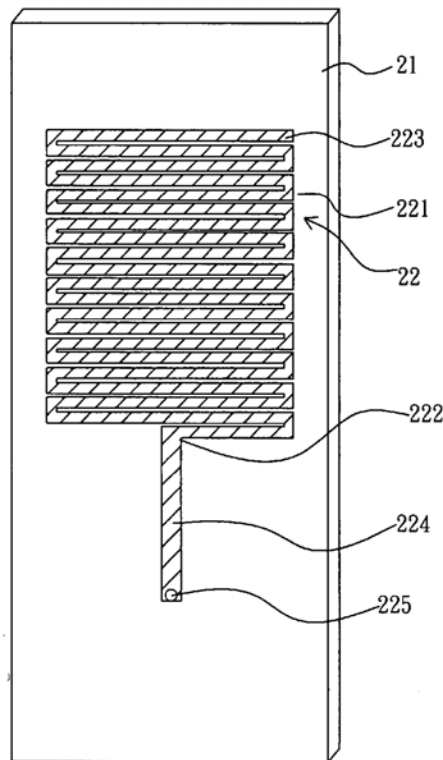
A miniaturized planar antenna of digital television comprises an insulation plate a metal radiator combined with a first surface thereof, a metal grounding element connected to a second surface thereof and a metal parasitic element. The metal radiator has a meander line portion and the metal parasitic element also has a meander line portion and is corresponding to a position of the metal radiator; the transmission efficiency of digital television signals can be elevated by broadening an electromagnetic signal receiving bandwidth of the antenna by means of the metal parasitic element.

(73) Assignee: **WISTRON NEWEB CORPORATION**

(21) Appl. No.: **11/798,051**

(22) Filed: **May 9, 2007**

20





US 20080074327A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0074327 A1**  
(43) **Pub. Date: Mar. 27, 2008**

(54) **ANTENNA APPARATUS**

**Publication Classification**

(76) Inventors: **Junichi Noro**, Akita (JP); **Akira Yoneya**, Akita (JP); **Isao Fukae**, Tokyo (JP); **Tomohiro Shinkawa**, Tokyo (JP); **Kazunari Saito**, Akita (JP); **Akira Miyoshi**, Tokyo (JP); **Satoshi Kohno**, Akita (JP)

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

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

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

(57) **ABSTRACT**

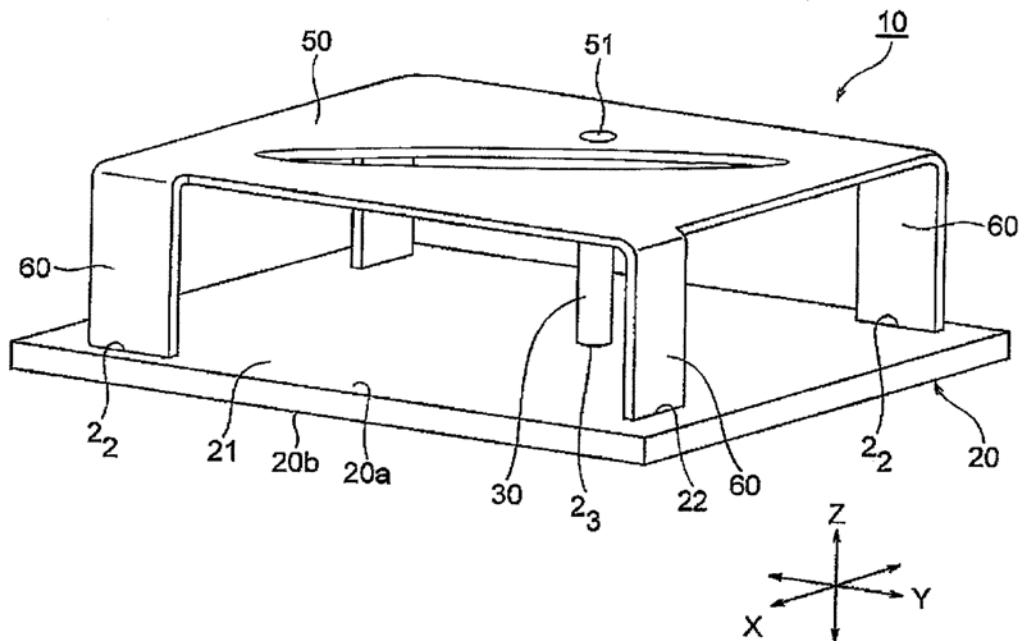
An antenna apparatus includes: a circuit board that has a main surface and a rear surface opposite to each other; an antenna element that is formed of a metal plate and is arranged at a predetermined distance from the main surface of the circuit board; a plurality of legs that extend from the antenna element toward the circuit board; a ground conductor that is formed on the main surface or the rear surface of the circuit board; a feeding pin that supplies power from the circuit board to the antenna element; and a plurality of comb-shaped capacitor patterns that are formed on one of or both the main surface and the rear surface of the circuit board and are electrically connected between the plurality of legs and the ground conductor.

(21) Appl. No.: 11/858,253

(22) Filed: Sep. 20, 2007

(30) **Foreign Application Priority Data**

Sep. 21, 2006 (JP) ..... P2006-255904  
Sep. 21, 2006 (JP) ..... P2006-255933  
Oct. 2, 2006 (JP) ..... P2006-270929  
Jul. 12, 2007 (JP) ..... P2007-183668





US 20080074329A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0074329 A1**  
(43) **Pub. Date: Mar. 27, 2008**

(54) **BUTTON ANTENNA FOR HANDHELD DEVICES**

**Publication Classification**

(76) Inventors: **Ruben Caballero**, San Jose, CA (US); **Teodor Dabov**, Mountain View, CA (US); **Zhijun Zhang**, Santa Clara, CA (US); **John Benjamin Filson**, San Jose, CA (US); **Emery Artemus Sanford**, San Francisco, CA (US)

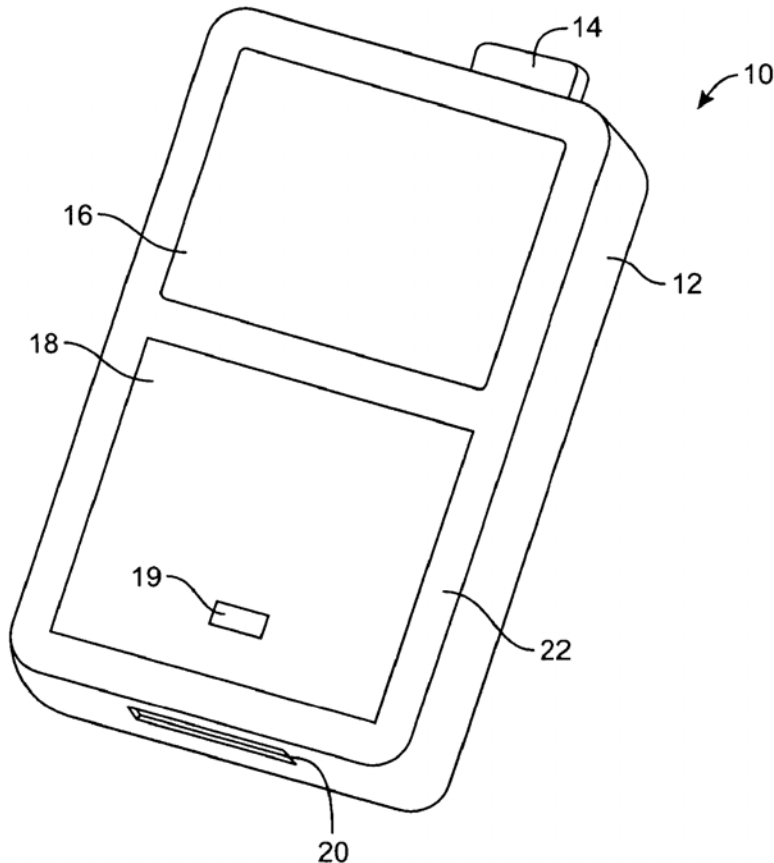
(51) **Int. Cl.**  
**H01Q 1/24** (2006.01)  
(52) **U.S. Cl.** ..... **343/702**  
(57) **ABSTRACT**

Correspondence Address:  
**G. VICTOR TREYZ**  
**870 MARKET STREET, FLOOD BUILDING,**  
**SUITE 984**  
**SAN FRANCISCO, CA 94102**

Antennas, handheld electronic devices containing antennas, and methods for using antennas and handheld electronic devices are provided. A handheld device may have a conductive case. The antenna can be formed as part of a button such as a pushbutton. The pushbutton may protrude from the conductive case sufficiently to allow good transmission and reception of wireless signals. The protruding antenna contains a radiating element, while the conductive case serves as a ground. The radiating element may be formed from a low-profile antenna structure such as a planar antenna structure formed on a circuit board substrate. The pushbutton may be used to control operation of the handheld electronic device. With one suitable arrangement, actuation of the pushbutton antenna causes the antenna to protrude from the case and turns on transceiver circuitry in the handheld device.

(21) Appl. No.: **11/527,192**

(22) Filed: **Sep. 25, 2006**





US 20080074330A1

(19) **United States**

(12) **Patent Application Publication**  
**Lin**

(10) **Pub. No.: US 2008/0074330 A1**

(43) **Pub. Date: Mar. 27, 2008**

(54) **ELECTRONIC APPARATUS WITH AN ANTENNA**

**Publication Classification**

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

(76) **Inventor: Yung-Sen Lin, Sijhih City (TW)**

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

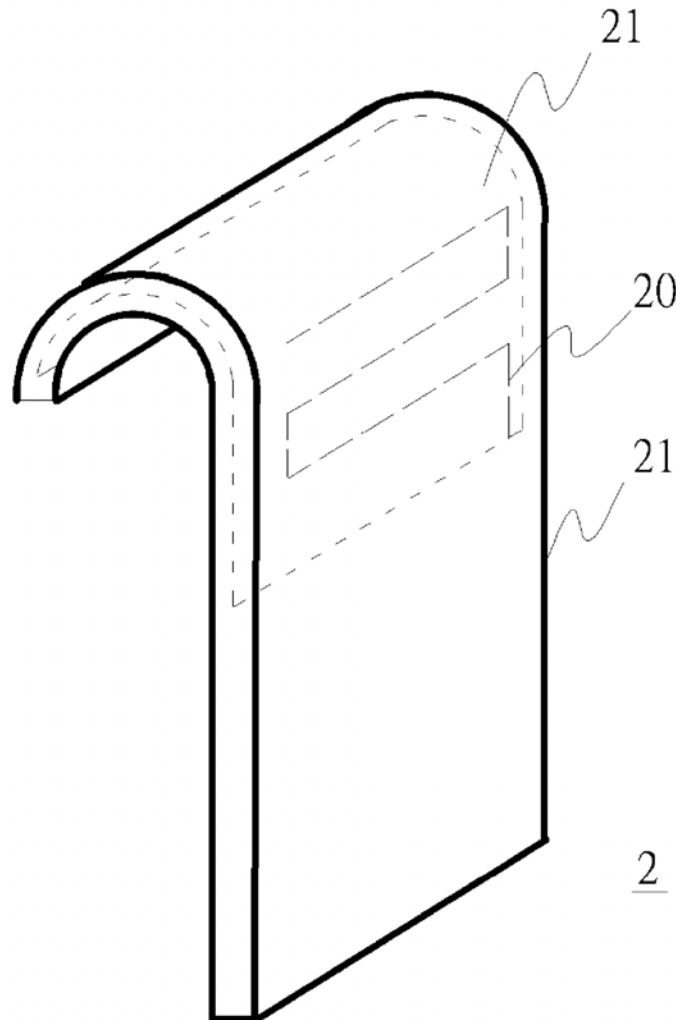
(57) **ABSTRACT**

Correspondence Address:  
**LAW OFFICES OF LAI AND ASSOCIATES, P.C.**  
**5800 RANCHESTER STE 200**  
**HOUSTON, TX 77036**

An electronic apparatus with an antenna, an anti-jamming system and a method are disclosed. The electronic apparatus comprises a casing and the antenna. The antenna is composed of a patterned metal thin film and a carrier and provided for processing a wireless signal. The casing and the antenna are made by injection molding. When the electronic apparatus has a display device, the anti-jamming system can modulate a clock signal generated by the display device to prevent the multiplication of clock signal from interfering with signals within an operating band of the antenna.

(21) **Appl. No.: 11/534,524**

(22) **Filed: Sep. 22, 2006**





US 20080074331A1

(19) **United States**

(12) **Patent Application Publication**  
**Stanton**

(10) **Pub. No.: US 2008/0074331 A1**  
(43) **Pub. Date: Mar. 27, 2008**

(54) **ANTENNA IN A WIRELESS SYSTEM**

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

(75) **Inventor: Kevin Patrick Stanton, Glenview, IL (US)**

(57) **ABSTRACT**

Correspondence Address:  
**BANNER & WITCOFF, LTD.**  
**TEN SOUTH WACKER DRIVE, SUITE 3000**  
**CHICAGO, IL 60606**

The present invention provides apparatuses and methods for an antenna in a wireless receiving system. The antenna includes an opened segmented component that is electrically coupled to a printed circuit board and a capacitive top loaded component that provides a capacitive load. The vertical profile of the antenna may be reduced sufficiently so that the antenna may be internally located in the same enclosure as the printed circuit board. The capacitive top loaded component is situated away from a ground plane of a printed circuit board to reduce the capacitive coupling is reduced, and consequently the required voltage standing wave ration (VSWR) is maintained over a broad operating range. The capacitive top loaded component includes a closed shape that provides a capacitive load. In order to tune the antenna to operate with a desired characteristic (e.g., within a VSWR criterion), the closed shape may be modified.

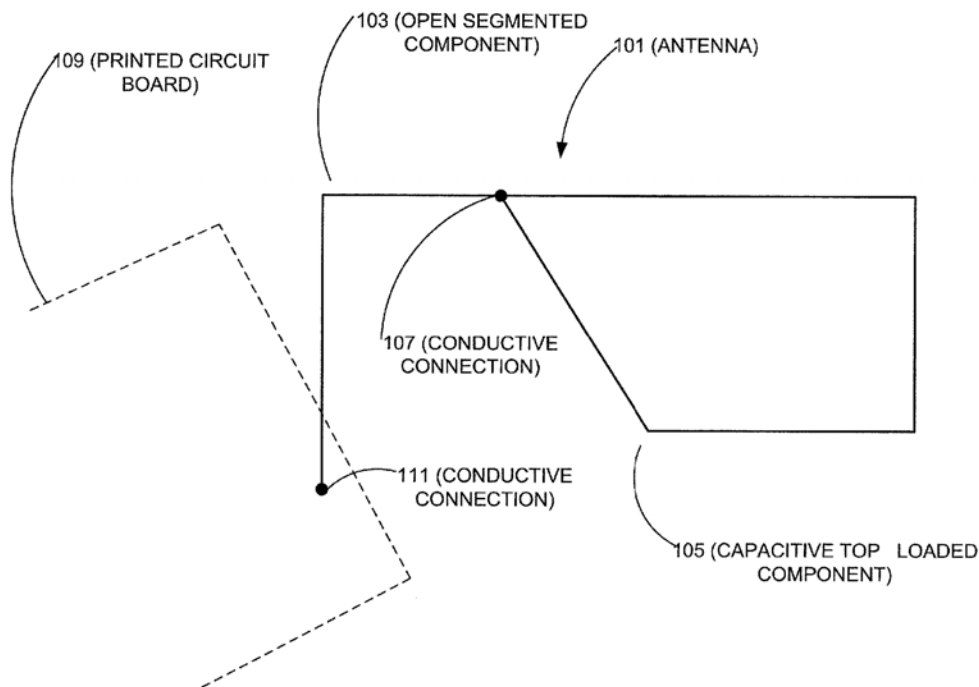
(73) **Assignee: Shure Acquisition Holdings, Inc., Niles, IL (US)**

(21) **Appl. No.: 11/534,802**

(22) **Filed: Sep. 25, 2006**

**Publication Classification**

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





US 20080074333A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2008/0074333 A1**  
Seo (43) **Pub. Date: Mar. 27, 2008**

(54) **EXTENDABLE BUILT-IN ANTENNA UNIT OF MOBILE DEVICE**

(30) **Foreign Application Priority Data**

Aug. 3, 2006 (KR)..... 2006-0073405

(75) Inventor: **Sung In Seo, Suwon-si (KR)**

**Publication Classification**

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

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

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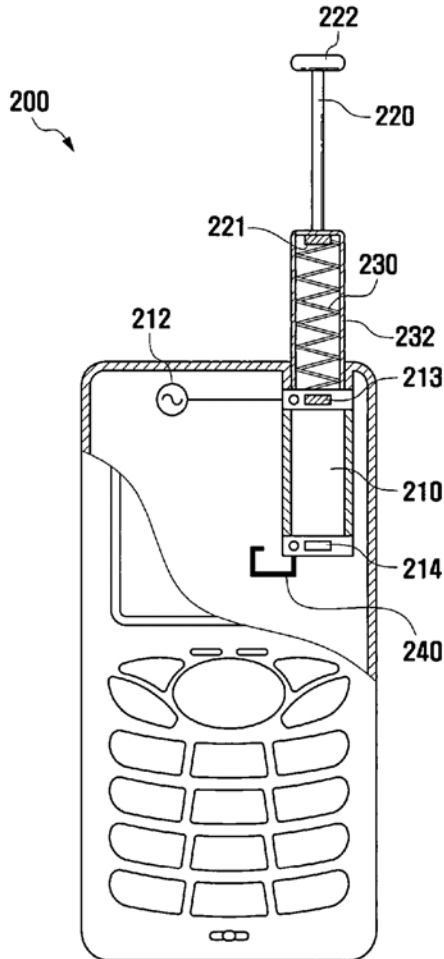
(57) **ABSTRACT**

An extendable built-in antenna unit for a mobile device is disclosed that includes a whip antenna, a helical antenna, an antenna receiving part and an antenna pattern. The helical antenna may be extractably and retractably mounted in the antenna receiving part. The whip antenna may be extractably and retractably mounted in the helical antenna. The helical antenna and the antenna pattern may be formed with lengths determined according to the resonance frequency.

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

(21) Appl. No.: **11/709,313**

(22) Filed: **Feb. 21, 2007**





US 20080074335A1

(19) **United States**

(12) **Patent Application Publication**  
**SUH**

(10) **Pub. No.: US 2008/0074335 A1**

(43) **Pub. Date: Mar. 27, 2008**

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

**Publication Classification**

(75) Inventor: **Young-Hoon SUH**, Yongin-si (KR)

(51) **Int. Cl.**  
*H01Q 1/22* (2006.01)  
*H01Q 9/04* (2006.01)

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

(57) **ABSTRACT**

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

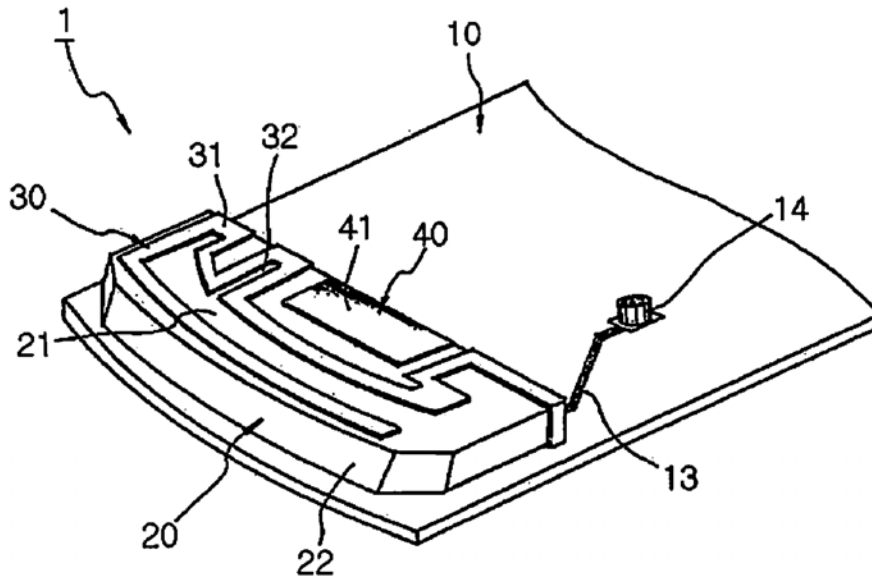
Provided is a built-in antenna for a portable terminal. The built-in antenna includes a main board including a feed pad electrically connected to a Radio Frequency (RF) connector, and a ground layer with a predetermined area; an antenna carrier installed on the main board and having a predetermined height; an antenna radiator installed at the antenna carrier and having a predetermined shape, the antenna radiator being electrically connected to the feed pad; and a conductor installed at a predetermined portion of the antenna carrier, the conductor being electrically connected to the ground layer.

(21) Appl. No.: **11/860,978**

(22) Filed: **Sep. 25, 2007**

(30) **Foreign Application Priority Data**

Sep. 25, 2006 (KR) ..... 2006-0092715





US 20080074337A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0074337 A1**

(43) **Pub. Date: Mar. 27, 2008**

(54) **TRIPLE POLARIZED SLOT ANTENNA**

(52) **U.S. CL. .... 343/769**

(75) Inventors: **Lars Manholm, Goteborg (SE);  
Fredrik Harrysson, Goteborg (SE)**

(57) **ABSTRACT**

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The present invention relates to an antenna arrangement comprising a dielectric medium (2) with a first side (3) and a second side (4), with a feeding arrangement (6; 6') on the first side and at least one slot (5; 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73) in a ground plane on the second side, where the feeding arrangement comprises at least a first (13; 13'; 37; 37'), a second (14; 14'; 38; 38'), a third (15; 15'; 41; 41') and a fourth (16; 16'; 42; 42') feeding conductor, each intersecting the gap of the slot (5; 62, 63, 64, 65; 66, 67, 68, 69, 70, 71, 72, 73), where each intersection constitute a feeding point (17, 18, 19, 20; 39, 40, 43, 44, 50, 51, 52, 53) for the antenna arrangement (1; 1'; 1"; 1'''). In a first mode of operation, a first constant E-field (26) that is directed across the slot is obtained. In a second mode of operation, a second E-field (28) which is directed across the slot, having a sinusoidal variation is obtained. In a third mode of operation, a third E-field (30) which is directed across the slot, having a sinusoidal variation, is obtained.

(73) Assignee: **TELEFONAKTIEBOLAGET LM  
ERICSSON (PUBL), Stockholm (SE)**

(21) Appl. No.: **11/722,389**

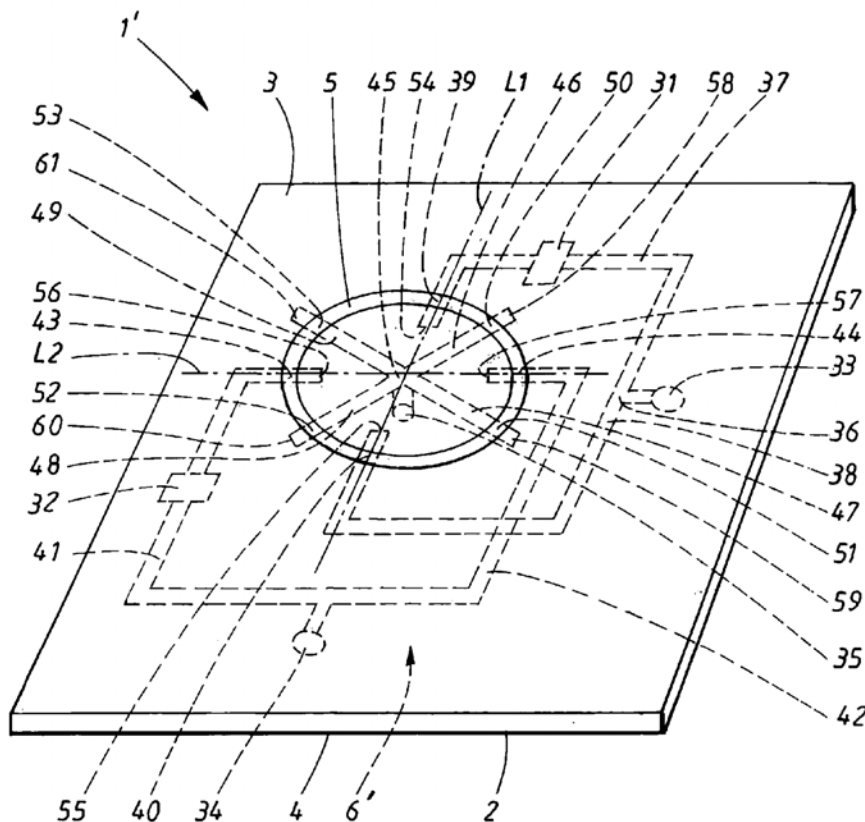
(22) PCT Filed: **Dec. 27, 2004**

(86) PCT No.: **PCT/SE04/02012**

§ 371(c)(1),  
(2), (4) Date: **Nov. 30, 2007**

**Publication Classification**

(51) **Int. Cl.  
H01Q 13/12 (2006.01)**







US 20080074339A1

(19) **United States**

(12) **Patent Application Publication**

Lee et al.

(10) **Pub. No.: US 2008/0074339 A1**

(43) **Pub. Date: Mar. 27, 2008**

(54) **BENT FOLDED DIPOLE ANTENNA FOR REDUCING BEAM WIDTH DIFFERENCE**

**Publication Classification**

(51) **Int. Cl.**  
*H01Q 9/26* (2006.01)

(52) **U.S. Cl.** ..... 343/803; 343/795

(57) **ABSTRACT**

(75) Inventors: **Seung-Chul Lee**, Pusan-shi (KR);  
**Jae-Sun Jin**, Incheon-shi (KR);  
**Myung-Kuk Kim**, Youngin-shi (KR)

The present invention relates to a bent folded dipole antenna for reducing a beam width difference, which can reduce a beam width difference, varying with a frequency band, and generate dual polarization through the use of an antenna structure having a bent folded dipole antenna unit, in which a plurality of bent folded dipole components is connected to each other as a single pattern, and a feeding unit for feeding a signal to the folded dipole antenna unit.

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Therefore, the present invention is advantageous in that it can reduce a beam width difference varying with a frequency band, simplify the structure of the antenna to reduce the cost thereof, and easily obtain dual polarization characteristics and wide band characteristics by combining a feeding unit for feeding a signal in a dual feeding manner with the bent folded dipole antenna unit implemented as a single pattern. In addition, the present invention is advantageous in that current flowing into the feed point of the feeding unit is induced only in folded dipole components without flowing into another feed point, thus realizing excellent isolation characteristics.

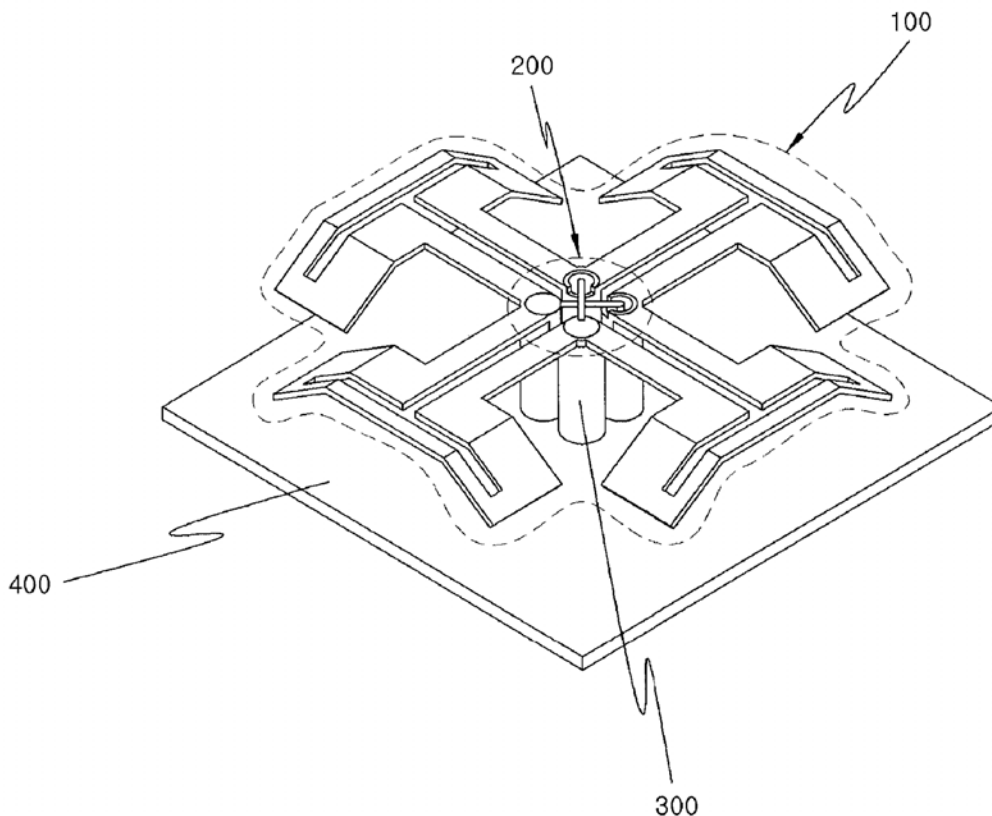
(73) Assignee: **Ace Antenna Corp.**, Incheon-shi (KR)

(21) Appl. No.: **11/622,847**

(22) Filed: **Jan. 12, 2007**

(30) **Foreign Application Priority Data**

Sep. 26, 2006 (KR) ..... 10-2006-0093198





US 20080074340A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0074340 A1**

(43) **Pub. Date: Mar. 27, 2008**

(54) **DUAL-FREQUENCY HIGH-GAIN ANTENNA**

**Publication Classification**

(75) Inventors: **Jia-Jiu Song**, Jhonghe City (TW);  
**Wei-Tong Cheng**, Hsinchu (TW)

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

(52) **U.S. Cl.** ..... **343/816; 343/820**

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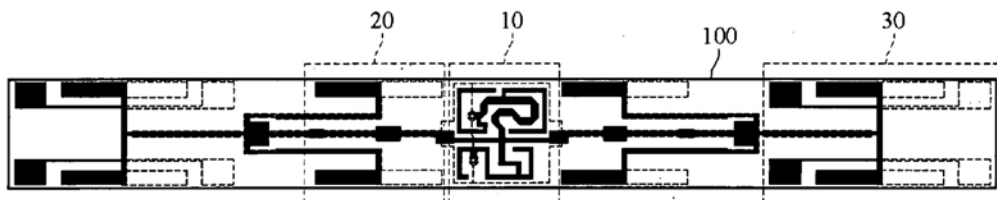
(57) **ABSTRACT**

A dual-frequency high-gain antenna is provided, which includes: a diplexer loop portion disposed at the center of the antenna substrate for receiving a feed signal; two single-frequency radiation units, symmetrically connected to two sides of the diplexer loop portion for radiating a radio-frequency signal corresponding to a first frequency value of the feed signal; and two dual-frequency radiation units, respectively connected to each single-frequency radiation portion for radiating radio-frequency signals corresponding to the first frequency value and a second frequency value of the feed signal.

(73) Assignee: **SmartAnt Telecom Co., Ltd.**,  
Hsinchu County (TW)

(21) Appl. No.: **11/526,663**

(22) Filed: **Sep. 26, 2006**





US 20080074341A1

(19) **United States**

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

(10) **Pub. No.: US 2008/0074341 A1**

(43) **Pub. Date: Mar. 27, 2008**

(54) **ANTENNA ASSEMBLY AND PORTABLE  
TERMINAL HAVING THE SAME**

**Publication Classification**

(76) Inventors: **Kyung-Ho CHUNG**, Seoul (KR);  
**Jung-Ho Yoon**, Seoul (KR)

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

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

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(57) **ABSTRACT**

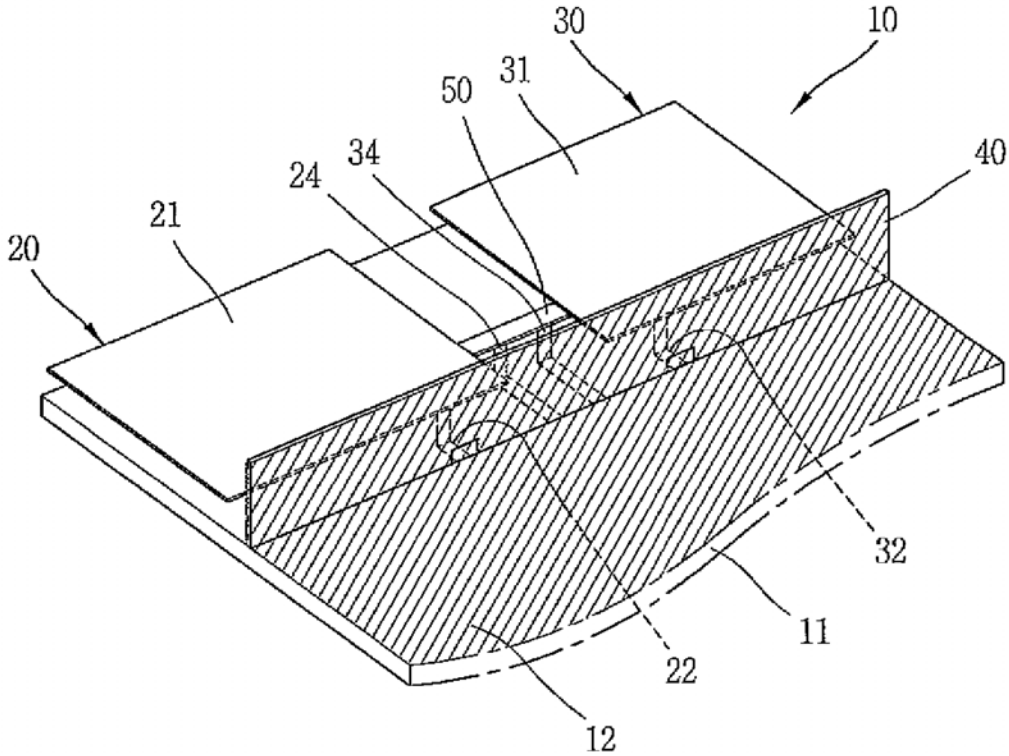
An antenna assembly, and a portable terminal having the same. The antenna assembly according to an embodiment comprises: a circuit board having a ground plane at a predetermined region; first and second antenna conductors spaced from each other at one side of the ground plane; and a shielding wall disposed between the ground plane and the antenna conductors, for reducing a coupling between the first and second antenna conductors. Since a plurality of antennas are mounted at a small space inside the portable terminal with maintaining their functions, an isolation characteristic between the antennas is enhanced, and a mutual coupling between the antennas is minimized.

(21) Appl. No.: **11/855,716**

(22) Filed: **Sep. 14, 2007**

(30) **Foreign Application Priority Data**

Sep. 27, 2006 (KR) ..... 10-2006-0094121





US 20080076351A1

(19) **United States**

(12) **Patent Application Publication**  
**WASHIRO**

(10) **Pub. No.: US 2008/0076351 A1**

(43) **Pub. Date: Mar. 27, 2008**

(54) **COMMUNICATION SYSTEM,  
COMMUNICATION APPARATUS, AND  
ELECTRIC-FIELD-COUPLING ANTENNA**

**Publication Classification**

(51) **Int. Cl.**  
*H04B 5/00* (2006.01)

(76) **Inventor:** Takanori WASHIRO, Kanagawa (JP)

(52) **U.S. Cl.** ..... 455/41.1

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(57) **ABSTRACT**

A communication system includes the following elements: a transmitter including a transmission circuit unit configured to generate an RF signal for transmitting data and an EFC antenna configured to transmit the RF signal as an electrostatic field or an induced electric field; a receiver including an EFC antenna and a reception circuit unit configured to receive and process the RF signal received by the EFC antenna; and an impedance snatching unit configured to make an impedance of the EFC antenna of the transmitter equal to an impedance of the EFC antenna of the receiver. The RF signal is transmitted by electric-field coupling between the EFC antennas, facing each other, of the transmitter and the receiver.

(21) **Appl. No.:** 11/838,544

(22) **Filed:** Aug. 14, 2007

(30) **Foreign Application Priority Data**

Sep. 11, 2006 (JP) ..... 2006-245614  
Jun. 6, 2007 (JP) ..... 2007-150500

