



US 20110050505A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0050505 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **SIMPLY FABRICABLE SMALL ZERO-ORDER RESONANT ANTENNA WITH EXTENDED BANDWIDTH AND HIGH EFFICIENCY**

**Publication Classification**

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

(75) **Inventors:** **Sungjoon Lim**, Gyeonggi-Do (KR);  
**Taehee Jang**, Gyeonggi-Do (KR)

(57) **ABSTRACT**

(73) **Assignee:** **CHUNG -ANG UNIVERSITY**  
**INDUSTRY-ACADEMY**  
**COOPERATION FOUNDATION**

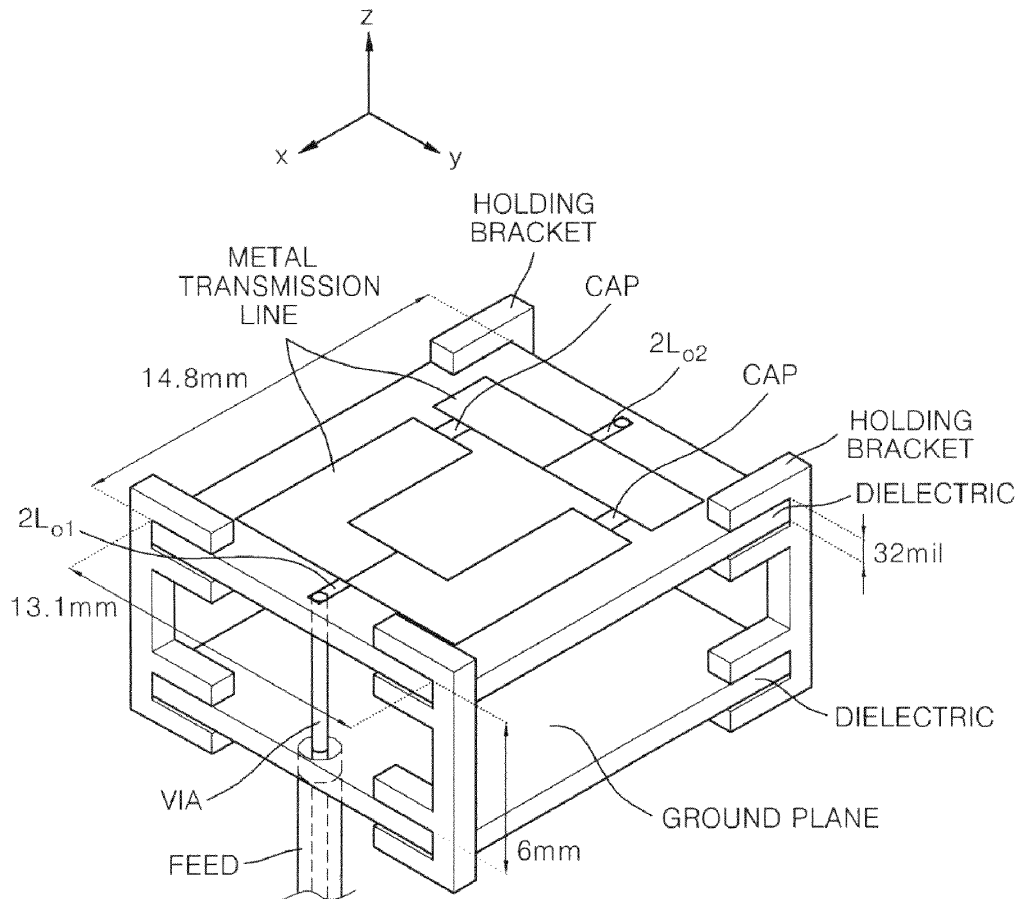
Provided is a simply fabricable small zeroth-order resonant antenna with extended bandwidth and high efficiency. The zeroth-order resonant antenna includes a feeding patch, a transmission line, and a pair of ground patches. The feeding patch is disposed on a top surface of a substrate having a mono-layer structure, and is configured to receive a signal from the outside. The transmission line includes a unit cell disposed on the top surface of the substrate and is configured to transmit a signal delivered from the feeding patch. The pair of ground patches is longitudinally disposed on the top surface of the substrate in the same direction as a longitudinal direction of the transmission line around the transmission line. The unit cell includes an upper patch and an inductor unit. The upper patch is disposed on the top surface of the substrate and is configured to receive a signal.

(21) **Appl. No.:** **12/807,176**

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

(30) **Foreign Application Priority Data**

Sep. 1, 2009 (KR) ..... 10-2009-0081727





US 20110050507A1

(19) **United States**

(12) **Patent Application Publication**  
**Miyakawa**

(10) **Pub. No.: US 2011/0050507 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **RADIO COMMUNICATION DEVICE**

**Publication Classification**

(75) Inventor: **Tetsu Miyakawa, Yokohama-shi (JP)**

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

(73) Assignee: **Kyocera Corporation, Kyoto (JP)**

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

(21) Appl. No.: **12/934,977**

(57) **ABSTRACT**

(22) PCT Filed: **Mar. 24, 2009**

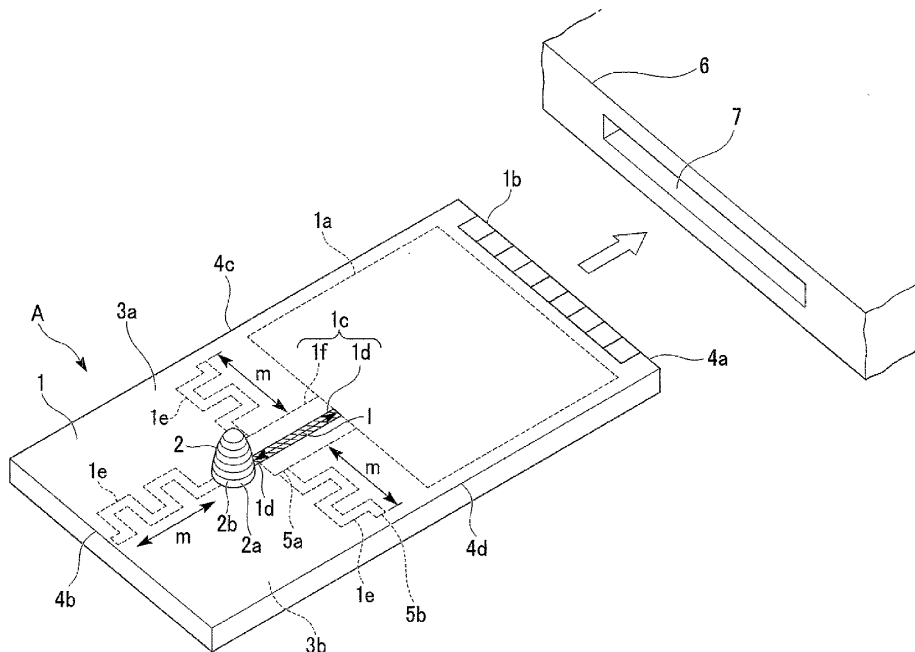
(86) PCT No.: **PCT/JP2009/055766**

§ 371 (c)(1),  
(2), (4) Date: **Nov. 9, 2010**

A radio communication device according to the present invention which is inserted into an expansion slot of an electronic device, includes: a printed circuit board having a rectangular shape, and provided with a connection terminal on one short side that connects to the expansion slot; an antenna element provided on the printed circuit board extending in a direction orthogonal thereto in the vicinity of another short side of the printed circuit board, and having a substantially  $\frac{1}{4}$   $\lambda$  electrical length; and a radial line extending on the printed circuit board with a position where the antenna element is arranged as an end point.

(30) **Foreign Application Priority Data**

Mar. 28, 2008 (JP) ..... 2008-087981





US 20110050508A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0050508 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **DUAL-BAND CAVITY-BACKED ANTENNA FOR INTEGRATED DESKTOP COMPUTER**

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

(76) **Inventors:** **Jerzy Guterman**, Mountain View, CA (US); **Eduardo Lopez Camacho**, Watsonville, CA (US); **Mattia Pascolini**, Campbell, CA (US); **Enrique Ayala Vazquez**, Watsonville, CA (US); **Robert W. Schlub**, Campbell, CA (US); **Ruben Caballero**, San Jose, CA (US)

(57) **ABSTRACT**

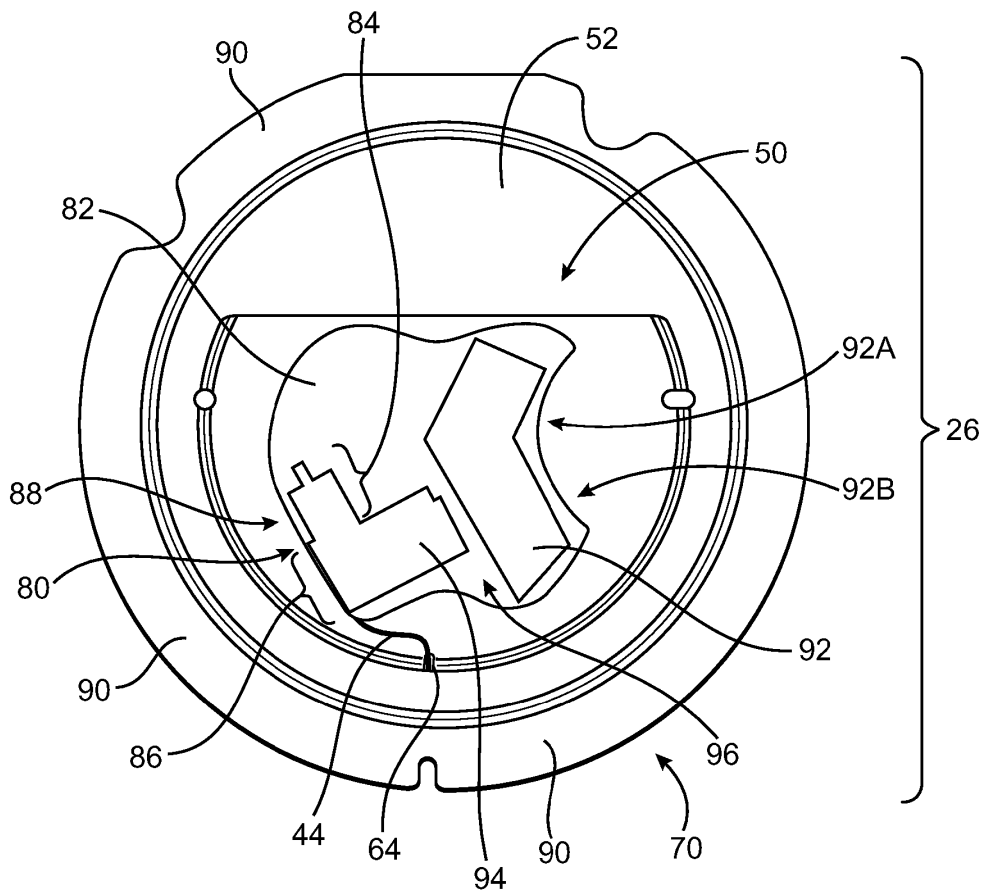
An electronic device may have a housing with conductive housing walls. A dielectric antenna window may be formed in an opening in one of the conductive housing walls. A dielectric logo may form the dielectric antenna window. A dielectric support structure may have an outline that matches the dielectric logo. An antenna resonating element for an antenna may be formed on the dielectric support structure. An antenna cavity for the antenna may be formed by a conductive cavity structure. A pattern of voids in the dielectric support structure may reduce dielectric loading for the antenna. The conductive cavity structure may be formed from solderable plated metal. The conductive cavity structure may have a planar lip that is attached to the conductive housing walls using conductive adhesive. Rear wall portions of the conductive cavity structure may be oriented at a non-perpendicular non-zero angle with respect to the planar lip.

(21) **Appl. No.: 12/553,943**

(22) **Filed: Sep. 3, 2009**

**Publication Classification**

(51) **Int. Cl.**  
**H01Q 1/38** (2006.01)  
**H01Q 1/24** (2006.01)  
**H01Q 5/00** (2006.01)





US 20110050509A1

(19) **United States**

(12) **Patent Application Publication**  
**Ayala Vazquez et al.**

(10) **Pub. No.: US 2011/0050509 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **CAVITY-BACKED ANTENNA FOR TABLET DEVICE**

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

(76) **Inventors:** **Enrique Ayala Vazquez**,  
Watsonville, CA (US); **Robert W. Schlub**,  
Campbell, CA (US); **Yi Jiang**,  
Cupertino, CA (US); **Rodney Andres Gomez Angulo**,  
Sunnyvale, CA (US); **Ruben Caballero**,  
San Jose, CA (US); **Qingxiang Li**,  
Mountain View, CA (US)

(57) **ABSTRACT**

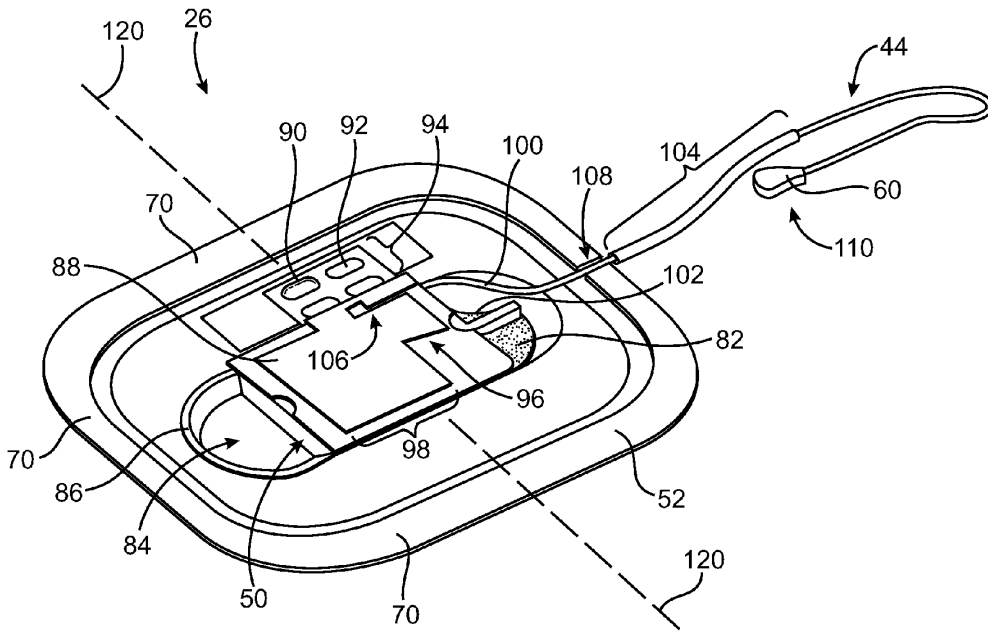
An electronic device may have a cavity antenna. The cavity antenna may have a logo-shaped dielectric window. An antenna resonating element for the cavity antenna may be formed from conductive traces on a printed circuit board. An antenna resonating element may be formed from the traces. The antenna resonating element may be mounted on an antenna support structure. A conductive cavity structure for the cavity antenna may have a planar lip that is mounted flush with an interior surface of a conductive housing wall. The cavity structure may have more than one depth. Shallower planar portions of the cavity structure may lie in a plane. The antenna resonating element may be located between the plane of the shallow cavity walls and an external surface of the conductive housing wall.

(21) **Appl. No.: 12/553,944**

(22) **Filed: Sep. 3, 2009**

**Publication Classification**

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





US 20110050510A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0050510 A1**

(43) **Pub. Date: Mar. 3, 2011**

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

(30) **Foreign Application Priority Data**

Aug. 27, 2009 (CN) ..... 200910306149.1

(75) Inventors: **ZHAN LI**, Shenzhen City (CN); **YE XIONG**, Shenzhen City (CN); **HAO-SHENG ZHANG**, Shenzhen City (CN); **WEI-DONG HAO**, Shenzhen City (CN); **GUANG PENG**, Shenzhen City (CN)

**Publication Classification**

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

(52) **U.S. Cl.** ..... **343/702; 343/866; 977/950**

(73) Assignees: **SHENZHEN FUTAIHONG PRECISION INDUSTRY CO., LTD.**, ShenZhen City (CN); **FIH (HONG KONG) LIMITED**, Kowloon (HK)

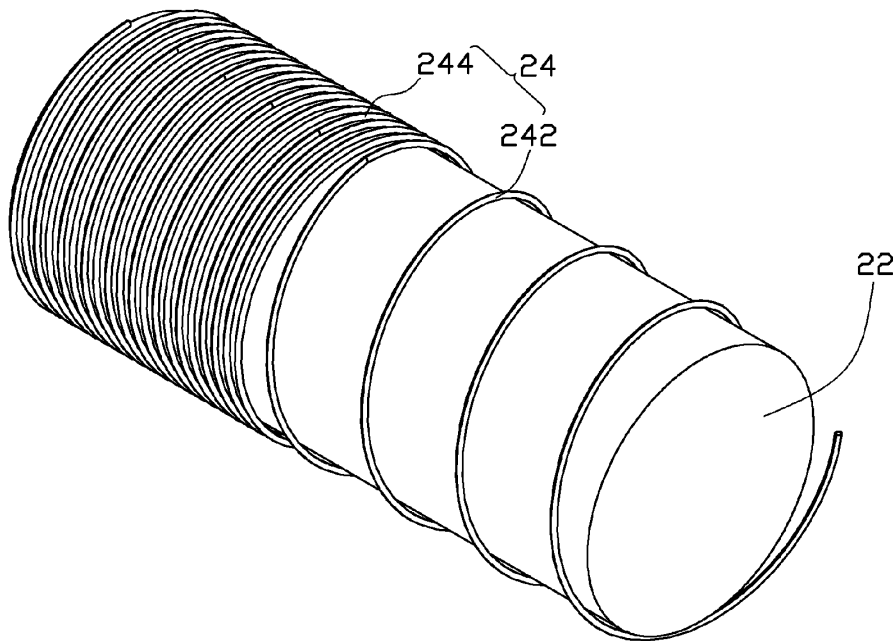
(57) **ABSTRACT**

An antenna module includes a frequency modulation radiator and a T-coil radiator electronically connecting to the frequency modulation radiator. The T-coil radiator and the frequency modulation radiator are made of conductive nano material. The present further discloses a wireless communication device using the antenna module.

(21) Appl. No.: **12/634,805**

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

20





US 20110050511A1

(19) **United States**

(12) **Patent Application Publication**  
**WANG**

(10) **Pub. No.: US 2011/0050511 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **DEVICE HOUSING**

(30) **Foreign Application Priority Data**

(75) Inventor: **QIANG WANG**, Shenzhen City (CN)

Sep. 3, 2009 (CN) ..... 200910306548.8

**Publication Classification**

(73) Assignees: **SHENZHEN FUTAIHONG PRECISION INDUSTRY CO., LTD.**, ShenZhen City (CN); **FIH (HONG KONG) LIMITED**, Kowloon (HK)

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

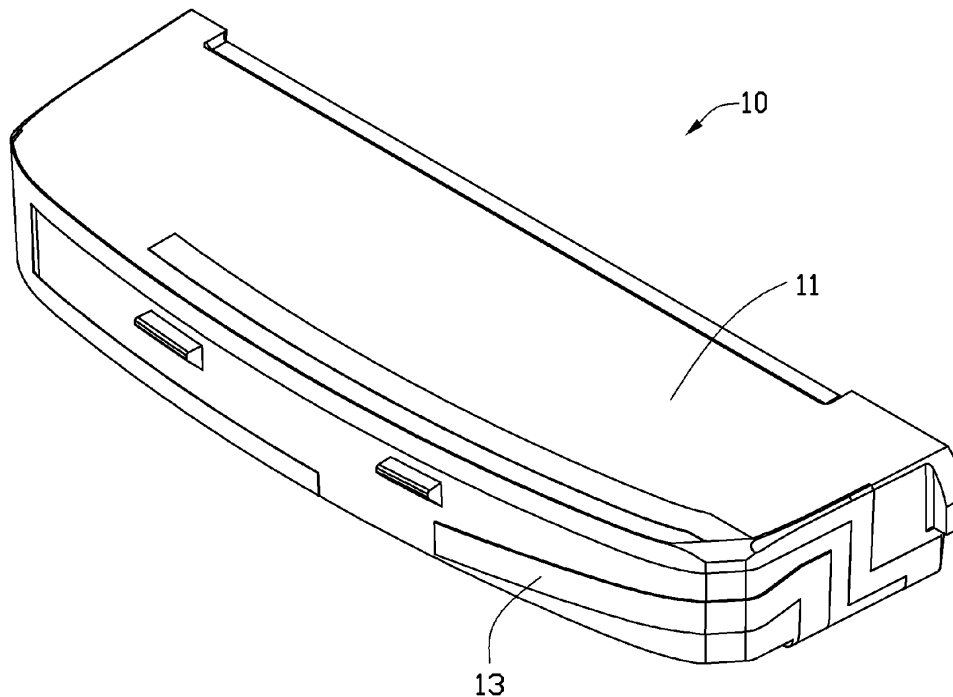
(52) **U.S. Cl.** ..... **343/702**

(57) **ABSTRACT**

(21) Appl. No.: **12/766,211**

A device housing comprises a main body and an three-dimensional antenna formed on the main body. The main body is made of non-conductive plastic. The three-dimensional antenna is made of conductive plastic. The main body and the three-dimensional antenna are formed by a two-shot injection molding process.

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





US 20110050512A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0050512 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **MOBILE TERMINAL DEVICE**

**Publication Classification**

(75) Inventors: **Masatomo MORI**, Kawasaki (JP);  
**Hiroyuki Yoshizawa**, Kawasaki (JP)

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

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

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

(21) Appl. No.: **12/872,477**

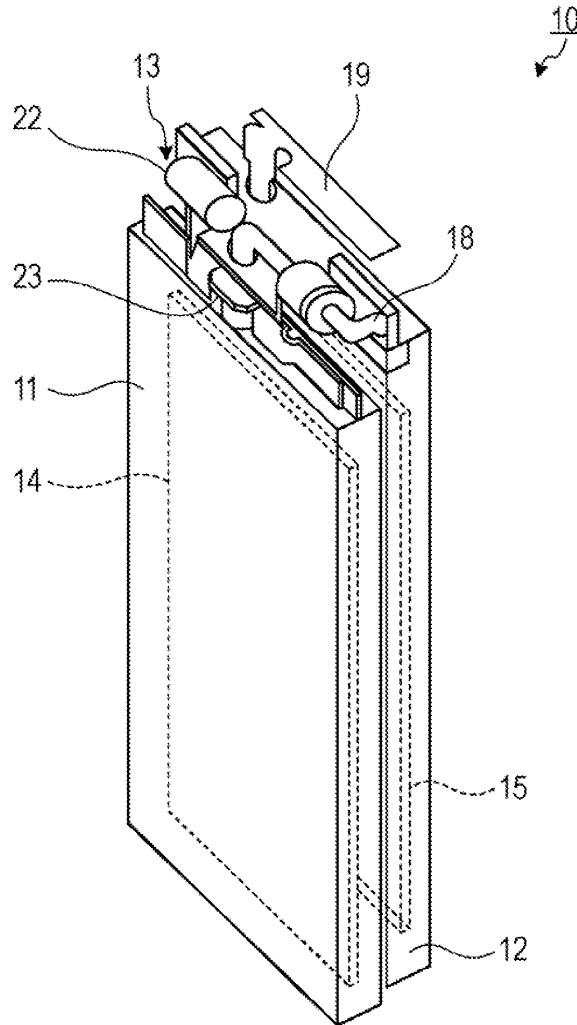
(57) **ABSTRACT**

(22) Filed: **Aug. 31, 2010**

A mobile terminal device includes: a first casing having a first antenna element; a second casing having a second antenna element; and a joint for rotatably joining the first casing and the second casing, the joint having third antenna element for electrically connecting the first antenna element and the second antenna element.

(30) **Foreign Application Priority Data**

Sep. 1, 2009 (JP) ..... 2009-202068





US 20110050513A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0050513 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **ANTENNAS FOR HANDHELD ELECTRONIC DEVICES WITH CONDUCTIVE BEZELS**

**Publication Classification**

(76) Inventors: **Robert J. Hill**, Salinas, CA (US);  
**Robert W. Schlub**, Campbell, CA (US);  
**Ruben Caballero**, San Jose, CA (US)

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

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

(21) Appl. No.: **12/941,006**

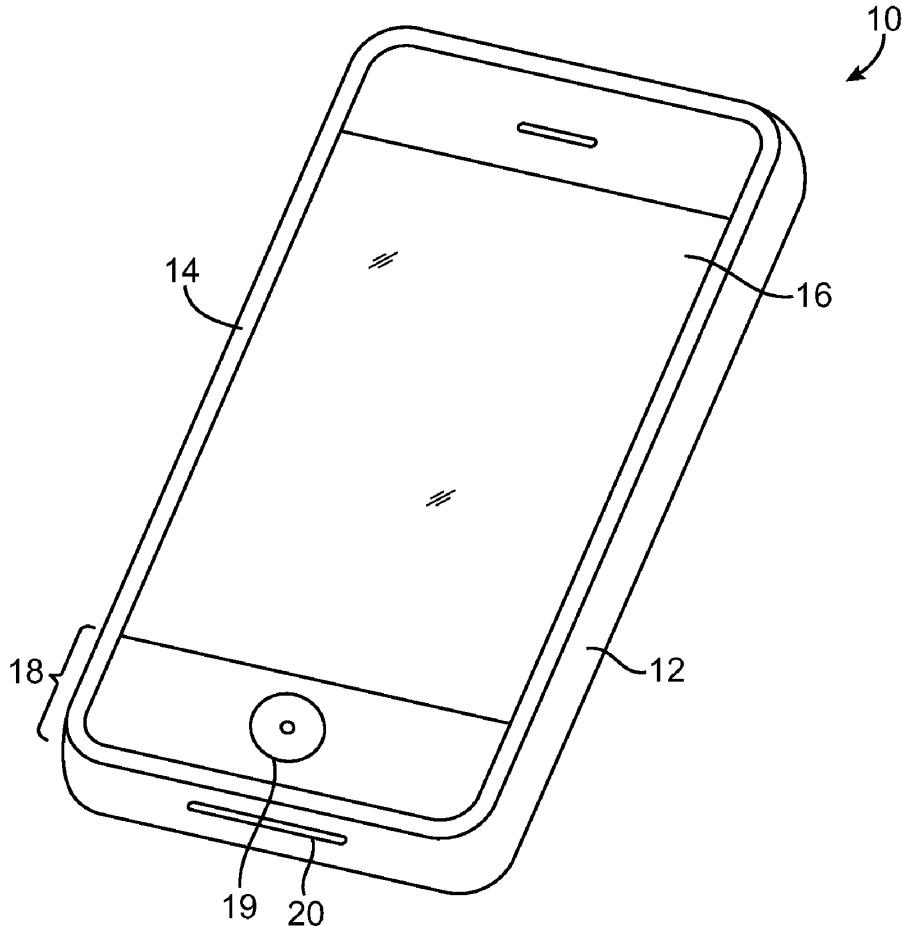
(57) **ABSTRACT**

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

A handheld electronic device may be provided that contains wireless communications circuitry. The handheld electronic device may have a housing and a display. The display may be attached to the housing a conductive bezel. The handheld electronic device may have one or more antennas for supporting wireless communications. A ground plane in the handheld electronic device may serve as ground for one or more of the antennas. The ground plane and bezel may define an opening. A rectangular slot antenna or other suitable slot antenna may be formed from or within the opening. One or more antenna resonating elements may be formed above the slot. An electrical switch that bridges the slot may be used to modify the perimeter of the slot so as to tune the communications bands of the handheld electronic device.

**Related U.S. Application Data**

(63) Continuation of application No. 12/564,803, filed on Sep. 22, 2009, now Pat. No. 7,843,396, which is a continuation of application No. 11/821,192, filed on Jun. 21, 2007, now Pat. No. 7,612,725.







US 20110050522A1

(19) **United States**

(12) **Patent Application Publication**  
**KUO**

(10) **Pub. No.: US 2011/0050522 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **MULTI-BAND ANTENNA APPARATUS**

**Publication Classification**

(75) Inventor: **CHAO-CHIANG KUO**, Hsinchu  
Hsien (TW)

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

(52) **U.S. Cl.** ..... **343/728; 343/725**

(73) Assignee: **MStar Semiconductor, Inc.**,  
Hsinchu Hsien (TW)

(57) **ABSTRACT**

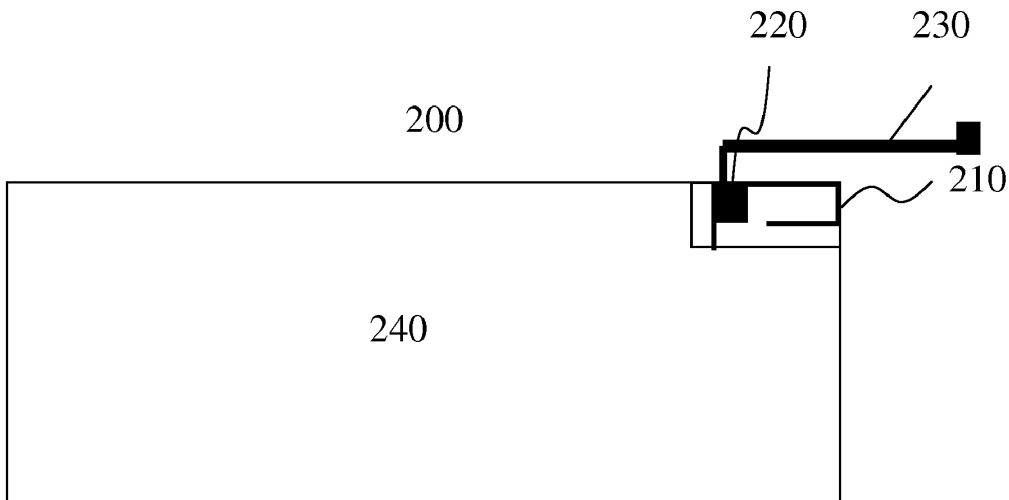
(21) Appl. No.: **12/822,613**

A multi-band antenna apparatus is provided. The multi-band antenna apparatus comprises a circuit board, a planar printed antenna with a feed-in point and a telescopic antenna. The planar printed antenna is printed on the circuit board. The telescopic antenna is coupled to the circuit board through the feed-in point. The planar printed antenna receives a first radio frequency signal, and then transmits the first radio frequency signal to the circuit board through the feed-in point. The telescopic antenna receives a second radio frequency signal and then transmits the second radio frequency to the circuit board.

(22) Filed: **Jun. 24, 2010**

(30) **Foreign Application Priority Data**

Sep. 2, 2009 (TW) ..... 098129587





US 20110050523A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0050523 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **THREE-DIMENSIONAL DUAL-BAND ANTENNA**

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

(75) **Inventors:** **Mao-Tse LIANG**, Hsinchu City (TW); **Shih-Chieh Cheng**, Tainan County (TW); **Kuo-Chang Lo**, Miaoli County (TW)

(57) **ABSTRACT**

A three-dimensional dual-band antenna including a first radiation portion, a second radiation portion, a connection portion, an impedance matching portion and a feeding portion is provided. The second radiation portion is located under the radiation portion and parallel with the first radiation portion. The connection portion is connected to the first side of the first radiation portion and extended downward vertically, for connecting the first radiation portion and the second radiation portion. The impedance matching portion is connected to a second side of the first radiation portion and extended downward vertically. The first side and the second side are opposite. The feeding portion is connected to the second side and extended downward vertically. The feeding portion receives a feeding signal. The first and the second radiation portion are operated at the first and the second bandwidth respectively, wherein the second bandwidth is in higher frequency than the first bandwidth.

(73) **Assignee:** **ARCADYAN TECHNOLOGY CORPORATION**, Hsinchu (TW)

(21) **Appl. No.:** **12/870,298**

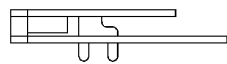
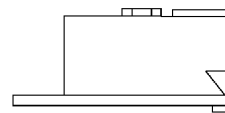
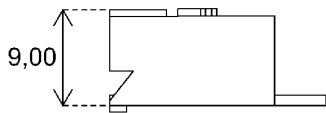
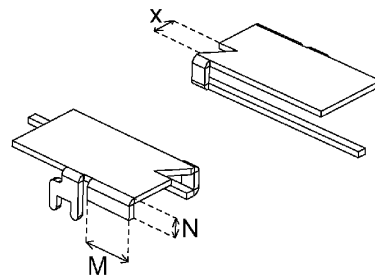
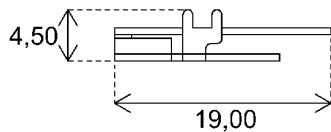
(22) **Filed:** **Aug. 27, 2010**

(30) **Foreign Application Priority Data**

Aug. 28, 2009 (TW) ..... 098129023

**Publication Classification**

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





US 20110050528A1

(19) **United States**

(12) **Patent Application Publication**  
**Montgomery**

(10) **Pub. No.: US 2011/0050528 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **HIGH ISOLATION ANTENNA SYSTEM**

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

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

(57) **ABSTRACT**

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

An antenna system supports a common resonance mode and differential resonance mode, each with approximately equal radiation resistance and bandwidth at a given operating frequency band. The antenna system includes a resonant antenna section, a counterpoise, and two antenna ports. The resonant antenna section includes two spaced-apart poles and a distributed network therebetween. Each of the poles has a proximal end connected to the distributed network and an opposite distal end. The distal ends of the poles are separated from each other by a distance of  $\frac{1}{3}$  to  $\frac{2}{3}$  of the electrical wavelength at the given operating frequency. Each of the two antenna ports is defined by a pair of feed terminals with one feed terminal located on the counterpoise and the other feed terminal located on a different one of the poles of the resonant antenna section. The resonant antenna section, counterpoise, and ports are configured such that a signal within the given operating frequency band applied to one port is isolated from the other port.

(21) **Appl. No.: 12/873,823**

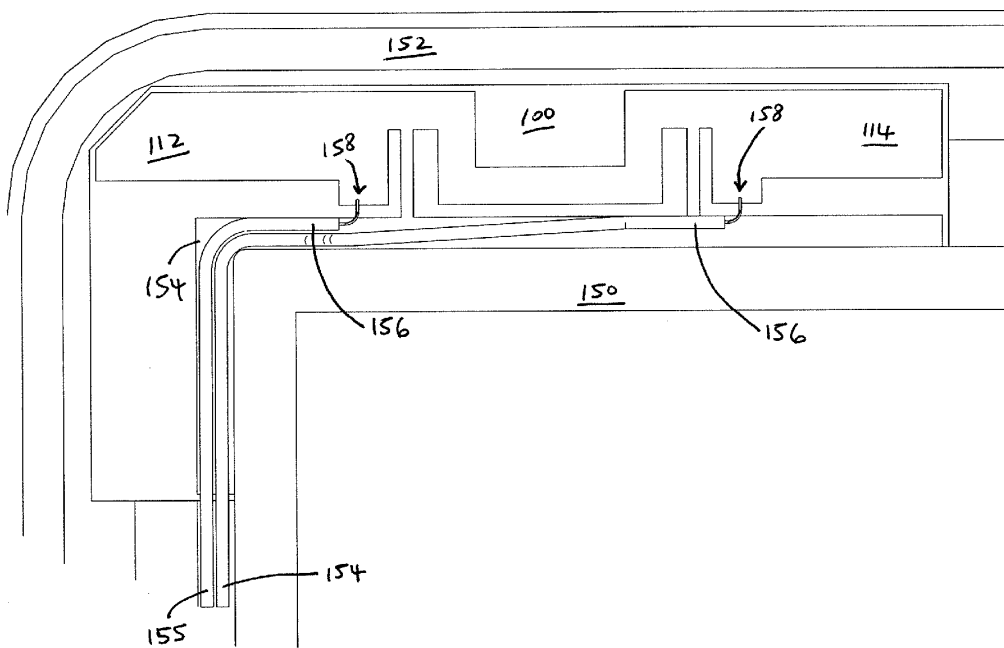
(22) **Filed: Sep. 1, 2010**

**Related U.S. Application Data**

(60) Provisional application No. 61/238,931, filed on Sep. 1, 2009.

**Publication Classification**

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





US 20110050531A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0050531 A1**

(43) **Pub. Date: Mar. 3, 2011**

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

Mar. 17, 2010 (JP) ..... 2010-060618  
Apr. 28, 2010 (JP) ..... 2010-103295

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

**Publication Classification**

(51) **Int. Cl.**  
**H01Q 7/04** (2006.01)

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

(52) **U.S. Cl.** ..... **343/842**

(21) Appl. No.: **12/869,238**

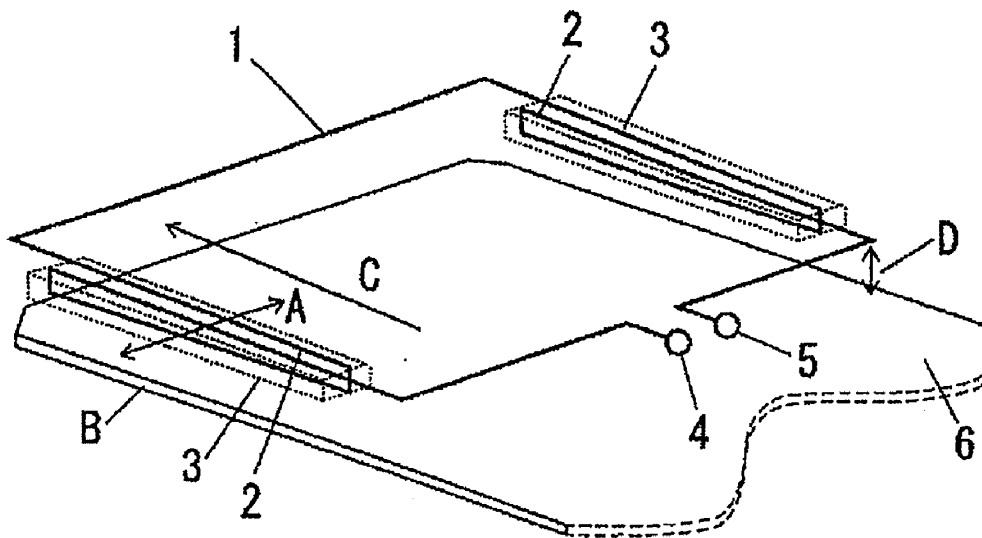
(57) **ABSTRACT**

(22) Filed: **Aug. 26, 2010**

An antenna unit includes a loop antenna 1; a metallic element 6 provided on one side of an aperture area of the loop antenna 1; and a coil 2 inserted into a line of the loop antenna 1. A coil axis of the coil 2 is parallel to the aperture area of the loop antenna 1 and not parallel to a direction of an electric current flowing through portions of the line of the loop antenna 1 before and after a point where the coil 2 is inserted.

(30) **Foreign Application Priority Data**

Aug. 28, 2009 (JP) ..... 2009-197843





US 20110050532A1

(19) **United States**

(12) **Patent Application Publication**  
**LIU**

(10) **Pub. No.: US 2011/0050532 A1**

(43) **Pub. Date: Mar. 3, 2011**

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

**Publication Classification**

(75) Inventor: **CHIEN-CHANG LIU**, Tu-Cheng (TW)

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

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

(52) **U.S. Cl.** ..... **343/846; 343/700 MS; 343/845**

(57) **ABSTRACT**

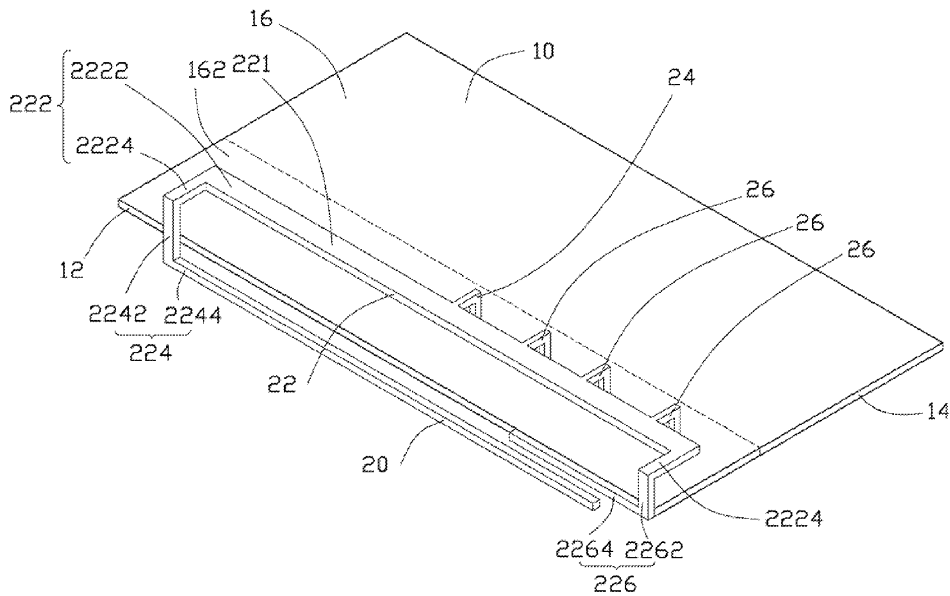
(21) Appl. No.: **12/627,056**

A portable wireless communication device includes a base circuit board, an antenna, and a switch. The base circuit board is a printed circuit board including a feed point and a ground point. The antenna is disposed on the base circuit board including a radiating portion, a feed portion, and a plurality of ground portions. The feed portion electrically connected to the ground point. The switch is electrically connected between the ground point and the plurality of ground portions to choose one ground portion to electrically connect to the ground point and obtain wide working frequency bands.

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

(30) **Foreign Application Priority Data**

Aug. 28, 2009 (CN) ..... 200910306263.4





US 20110050533A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0050533 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **GROUND STRUCTURE OF ANTENNA OF MOBILE TERMINAL**

(30) **Foreign Application Priority Data**

Aug. 28, 2009 (KR) ..... 10-2009-0080754

(75) Inventors: **Han Min Cho**, Yongin-si (KR);  
**Sang Moo Cha**, Suwon-si (KR);  
**Yong Tae Kim**, Hwaseong-si (KR);  
**Ung Ryeol Lee**, Suwon-si (KR)

**Publication Classification**

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

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

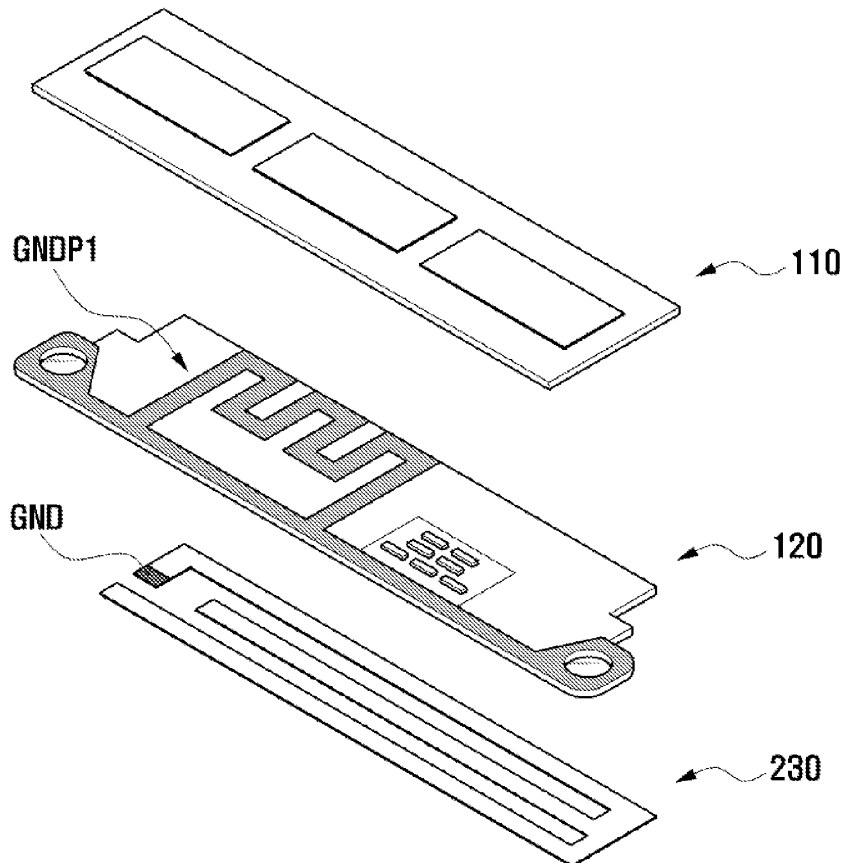
(57) **ABSTRACT**

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

An antenna ground structure of a mobile terminal is disclosed. The antenna ground structure of a mobile terminal is arranged to provide the ground pattern on a Printed Circuit Board (PCB) adjacent to the antenna and to electrically connect the ground pattern to the ground unit of the antenna, so that the area of the ground of the antenna may be expanded to improve Specific Absorption Rate (SAR) and communication performance.

(21) Appl. No.: **12/860,983**

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





US 20110050535A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0050535 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **ANTENNA, ANTENNA UNIT, AND COMMUNICATION DEVICE USING THEM**

(30) **Foreign Application Priority Data**

Aug. 28, 2009 (JP) ..... 2009-197844

May 21, 2010 (JP) ..... 2010-116868

(75) **Inventors:** **Shuichiro YAMAGUCHI**,  
Miyazaki (JP); **Kouichi NAKAMURA**,  
Miyazaki (JP); **Munenori FUJIMURA**,  
Miyazaki (JP)

**Publication Classification**

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

(52) **U.S. Cl.** ..... **343/870**

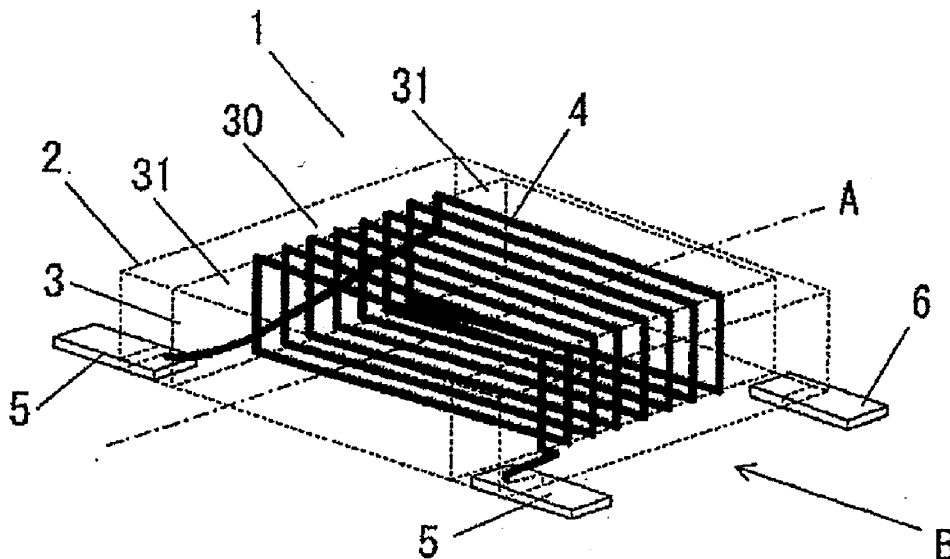
(57) **ABSTRACT**

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

An antenna has a base substrate 3, a coil 30 formed from a conductor 4 wound around the base substrate 3, and a plurality of terminals 5 connected to the conductor 4. Uncovered base substrate portions 31 where the conductor is absent are formed on the base substrate 3 except the start and end of turns of the coil 30. The terminals 5 are provided on respective sides of the coil 30 parallel to a coil axis and on the uncovered base substrate portions 31.

(21) **Appl. No.:** **12/869,250**

(22) **Filed:** **Aug. 26, 2010**





US 20110050536A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0050536 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **LOW-PROFILE TUNABLE WIDE-RANGE LOOP-SLOT ANTENNA**

**Publication Classification**

(76) Inventors: **Artem Shtatnov**, Newtown, PA (US); **Aleksander Gromov**, Freehold, NJ (US)

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

(52) **U.S. Cl.** ..... **343/870**

(57) **ABSTRACT**

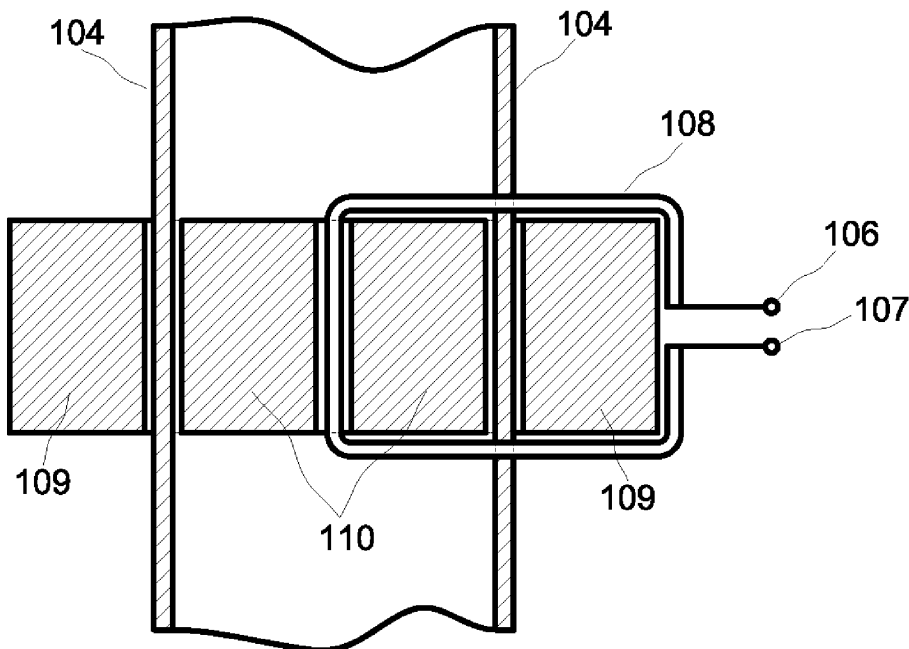
(21) Appl. No.: **12/870,839**

(22) Filed: **Aug. 29, 2010**

The Loop-Slot Antenna design provides a large range of tunable frequencies for transceiving while maintaining a small profile perfect for mounting on vehicles or other objects where a large antenna is impractical or infeasible. As compared with known vertical polarization antennas that have considerable height, for instance quarter-wave and half-wave vertical stubs of  $h=\lambda/4$  or  $h=\lambda/2$ , the antenna of this invention has height of  $h=\lambda/100$ .

**Related U.S. Application Data**

(60) Provisional application No. 61/238,191, filed on Aug. 30, 2009.







US 20110050538A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0050538 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **DUAL-BAND ANTENNA ASSEMBLY**

**Publication Classification**

(75) Inventors: **MIN CHEN**, Shanghai (CN);  
**CHO-JU CHUNG**, Tu-Cheng (TW)

(51) **Int. Cl.**  
**H01Q 5/00** (2006.01)  
**H01Q 21/00** (2006.01)  
**H01Q 1/38** (2006.01)

(73) Assignees: **AMBIT MICROSYSTEMS (SHANGHAI) LTD.**, SHANGHAI (CN); **HON HAI PRECISION INDUSTRY CO., LTD.**, Tu-Cheng (TW)

(52) **U.S. Cl.** ..... **343/893; 343/895; 343/700 MS**

(57) **ABSTRACT**

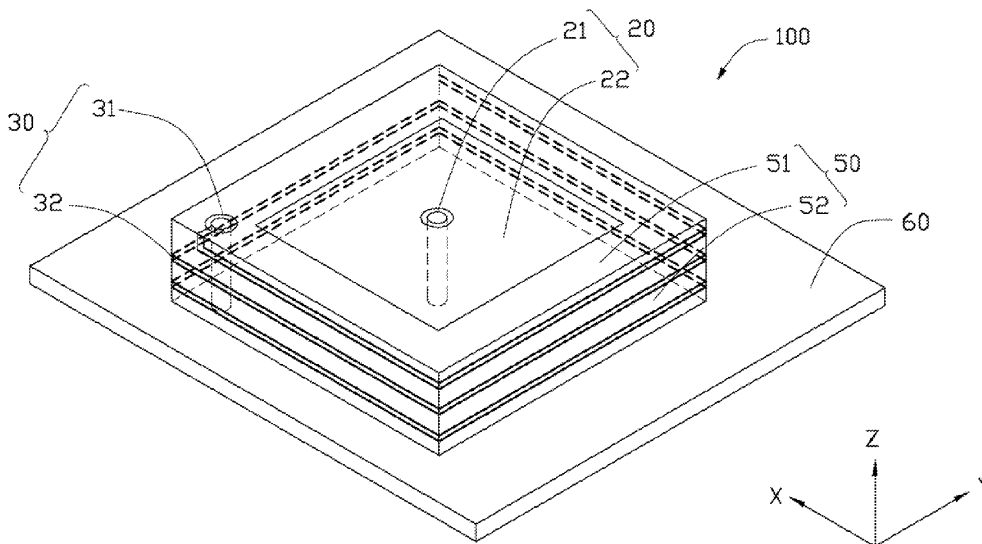
(21) Appl. No.: **12/627,014**

A dual-band antenna assembly is positioned on a substrate, and includes an insulation body, a plane antenna and a microstrip antenna. The insulation body includes a plane surface paralleled to the substrate, and a side surface perpendicularly extending from edges of the plane surface to the substrate. The plane antenna includes a first feed portion and a first radiator. The first feed portion passes through the substrate to the plane surface of the insulation body. The first radiator is substantially positioned on a center of the plane surface of the insulation body, and electrically connected to the first feed portion. The microstrip antenna includes a second feed portion and a second radiator. The second radiator is a microstrip, electrically connected to the second feed portion and positioned on the side surface of the insulation body.

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

(30) **Foreign Application Priority Data**

Aug. 26, 2009 (CN) ..... 200920308926.1





US 20110050539A1

(19) **United States**

(12) **Patent Application Publication**  
**CHEN**

(10) **Pub. No.: US 2011/0050539 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **MONOPOLE ANTENNA**

**Publication Classification**

(75) Inventor: **LUNG-PAO CHEN**, Tu-Cheng (TW)

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

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

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

(57) **ABSTRACT**

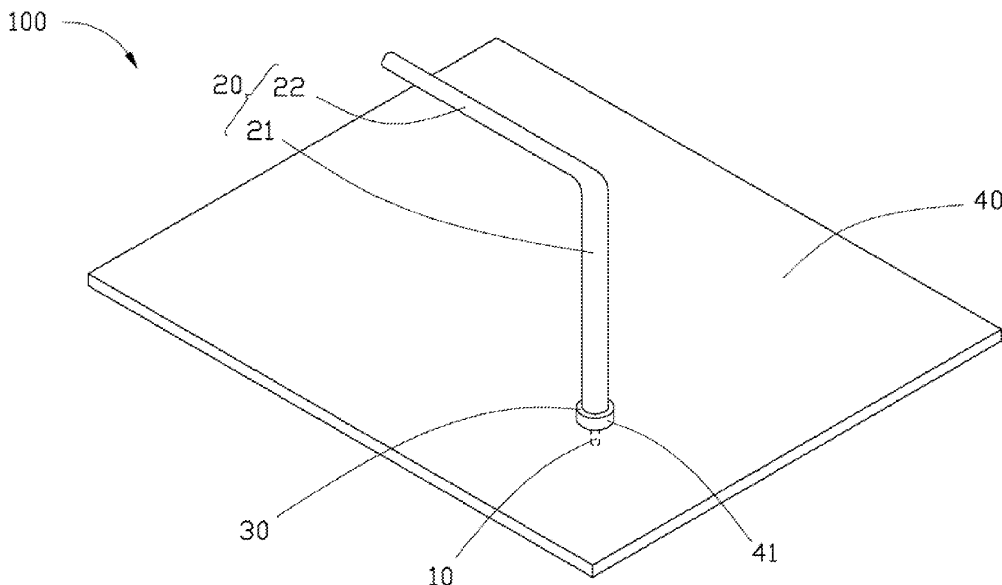
(21) Appl. No.: **12/629,124**

A monopole antenna includes a substrate, a feed portion, a radiating portion, and a position ring. The substrate defines a via hole. The feed portion feeds electromagnetic signals by way of the via hole. The radiating portion is L-shaped, and includes a first radiator and a second radiator. One end of the first radiator is connected to the feed portion, and perpendicular to the substrate. One end of the second radiator is perpendicularly connected to the other end of the first radiator, and the other end of the second radiator is free. The position ring is configured between the feed portion and the substrate, to securely position the radiating portion on the substrate.

(22) Filed: **Dec. 2, 2009**

(30) **Foreign Application Priority Data**

Aug. 26, 2009 (CN) ..... 200920308841.3





US 20110050540A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0050540 A1**

(43) **Pub. Date: Mar. 3, 2011**

(54) **MOBILE WIRELESS COMMUNICATIONS  
DEVICE INCLUDING AN ELECTRICALLY  
CONDUCTIVE DIRECTOR ELEMENT AND  
RELATED METHODS**

continuation of application No. 11/331,516, filed on  
Jan. 13, 2006, now Pat. No. 7,423,605.

**Publication Classification**

(75) Inventors: **Yihong Qi**, St. Agatha (CA);  
**Adrian Cooke**, Kitchener (CA);  
**Ying Tong Man**, Waterloo (CA);  
**Perry Jarmuszewski**, Waterloo  
(CA)

(51) **Int. Cl.**  
**H01Q 15/14** (2006.01)  
**H05K 13/00** (2006.01)

(52) **U.S. Cl.** ..... **343/912; 29/592.1**

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

(57) **ABSTRACT**

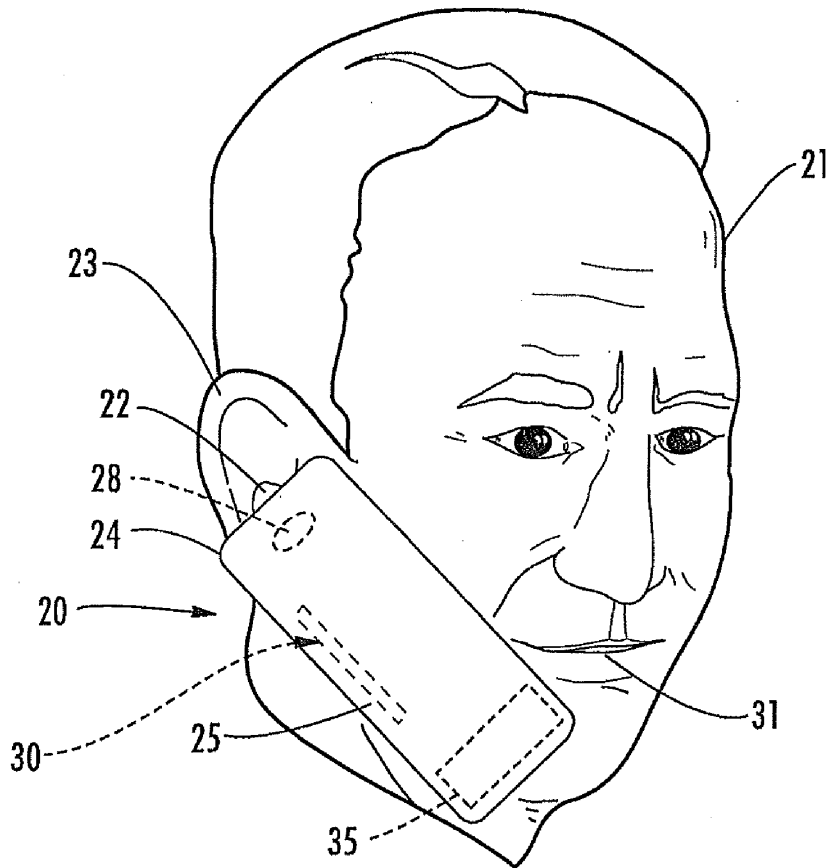
(21) Appl. No.: **12/939,043**

A mobile wireless communications device may include a portable housing, a printed circuit board (PCB) carried by the portable housing, a wireless transceiver carried by the PCB, and an antenna connected to the transceiver and carried by the PCB. The mobile wireless communications device may further include at least one director element for directing a beam pattern of the antenna. More particularly, the at least one director element may include an electrically conductive main branch carried by the portable housing, and an electrically conductive connector portion extending between the main branch and the PCB.

(22) Filed: **Nov. 3, 2010**

**Related U.S. Application Data**

(63) Continuation of application No. 12/198,157, filed on  
Aug. 26, 2008, now Pat. No. 7,830,325, which is a





US 20110057841A1

(19) **United States**

(12) **Patent Application Publication**  
**Betts-LaCroix**

(10) **Pub. No.: US 2011/0057841 A1**

(43) **Pub. Date: Mar. 10, 2011**

(54) **COMPACT ANTENNA**

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

(76) **Inventor: Jonathan Betts-LaCroix, San Mateo, CA (US)**

(57) **ABSTRACT**

(21) **Appl. No.: 12/436,428**

(22) **Filed: May 6, 2009**

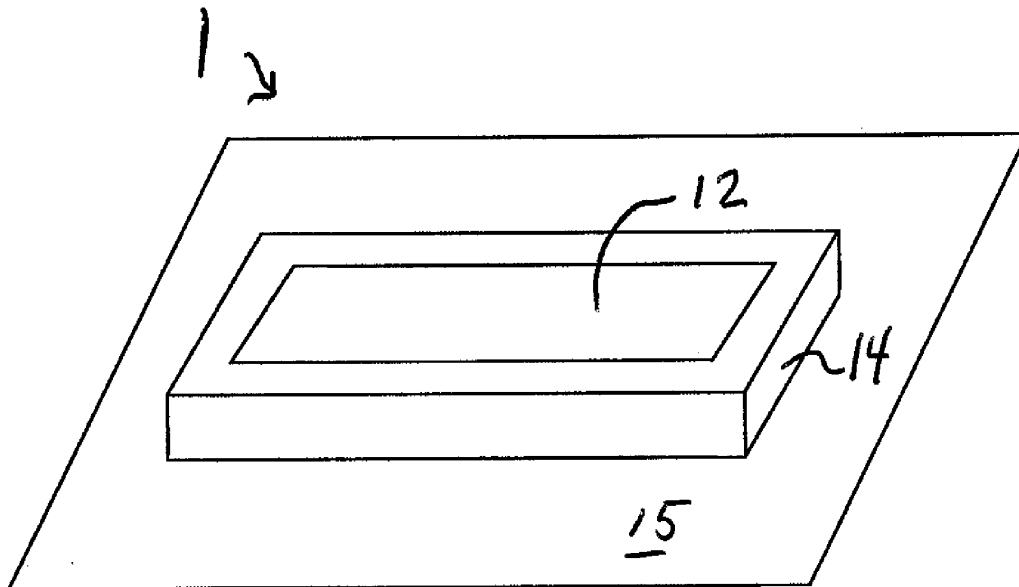
An antenna **1** for a hand held or small radio communication device such as a cellular radio handset, laptop computer or hand held computer, or GPS device. The antenna has a resonating element **12** over a ceramic material **14**, comprised of a high dielectric ceramic, such as barium strontium titanate, for example. The ceramic **14** is in contact with a ground plane **15** such as a grounded metal plate or grounded thin film that is formed on a substrate, such as an FR4 PCB substrate. The ceramic **14** is biased by a voltage source applied through an electrode plate **13** that is connected to a high voltage source **16** with respect to ground plate **15**. The voltage applied through the conductor or electrode **13** is controlled to provide a predetermined bias voltage that changes the electrostatic field of the ceramic **14**.

**Related U.S. Application Data**

(60) **Provisional application No. 61/050,642, filed on May 6, 2008.**

**Publication Classification**

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





US 20110057842A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0057842 A1**

(43) **Pub. Date: Mar. 10, 2011**

(54) **OVERSIZED ANTENNA FLEX**

**Publication Classification**

(75) Inventors: **Fletcher Rothkopf**, Los Altos, CA (US); **Brian Lynch**, Portola Valley, CA (US); **Wey-Jiun Lin**, Los Altos Hills, CA (US); **Kyle Yeates**, Palo Alto, CA (US); **Yi Jiang**, Sunnyvale, CA (US)

(51) **Int. Cl.**  
*H01Q 9/04* (2006.01)  
*H05K 13/00* (2006.01)  
(52) **U.S. Cl.** ..... **343/700 MS; 29/600**

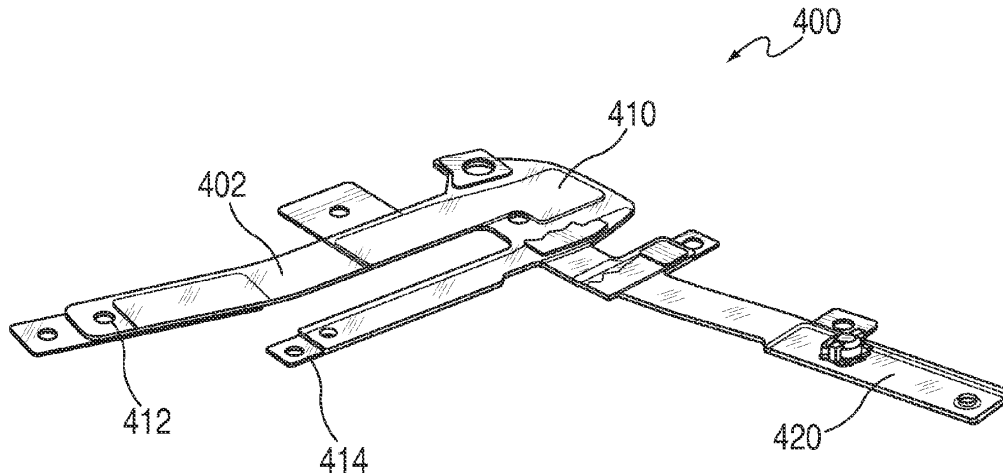
(73) Assignee: **Apple Inc.**, Cupertino, CA (US)

(57) **ABSTRACT**

This is directed to an antenna for use in an electronic device. The antenna can be constructed from a flex and printed trace, such that the flex is originally defined to be as large or nearly as large as possible to fit within portion of the electronic device dedicated to the antenna. This can allow the antenna trace to vary as the antenna is tuned without requiring a new flex having a different shape. In addition, this can allow the antenna design to be decoupled from the mechanical considerations related to mounting the antenna within the electronic device.

(21) Appl. No.: **12/555,651**

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





US 20110057843A1

(19) **United States**

(12) **Patent Application Publication**  
**Hallivuori**

(10) **Pub. No.: US 2011/0057843 A1**

(43) **Pub. Date: Mar. 10, 2011**

(54) **APPARATUS FOR WIRELESS COMMUNICATION**

**Publication Classification**

(75) Inventor: **Juha Samuel Hallivuori**, Tampere (FI)

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

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

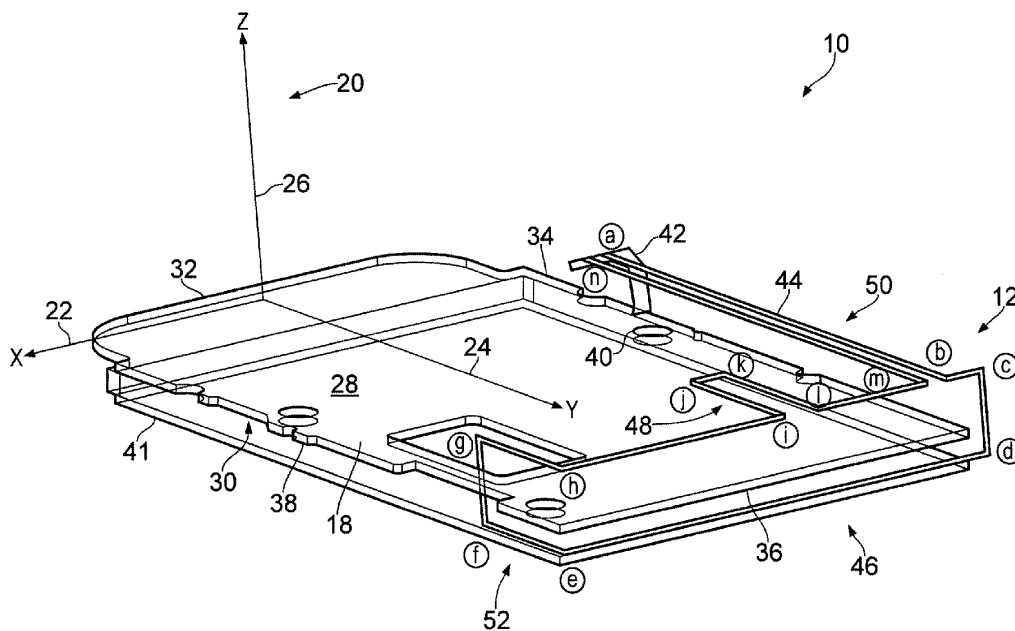
(73) Assignee: **Nokia Corporation**

(57) **ABSTRACT**

Apparatus including a ground member oriented in a first orientation; and an antenna including a first portion having a non-overlying arrangement with the ground member, the first portion being oriented in a second orientation, different to the first orientation.

(21) Appl. No.: **12/584,664**

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





US 20110057844A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0057844 A1**

(43) **Pub. Date: Mar. 10, 2011**

(54) **ANTENNA AND ELECTRONIC DEVICE  
EQUIPPED WITH SAME**

(30) **Foreign Application Priority Data**

Sep. 8, 2009 (JP) ..... 2009-207302

(75) Inventors: **Haruyuki WATANABE**, Hitachi (JP); **Naoki Iso**, Hitachi (JP); **Morihiko Ikegaya**, Kasumigaura (JP); **Tomoyuki Ogawa**, Hitachi (JP)

**Publication Classification**

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

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

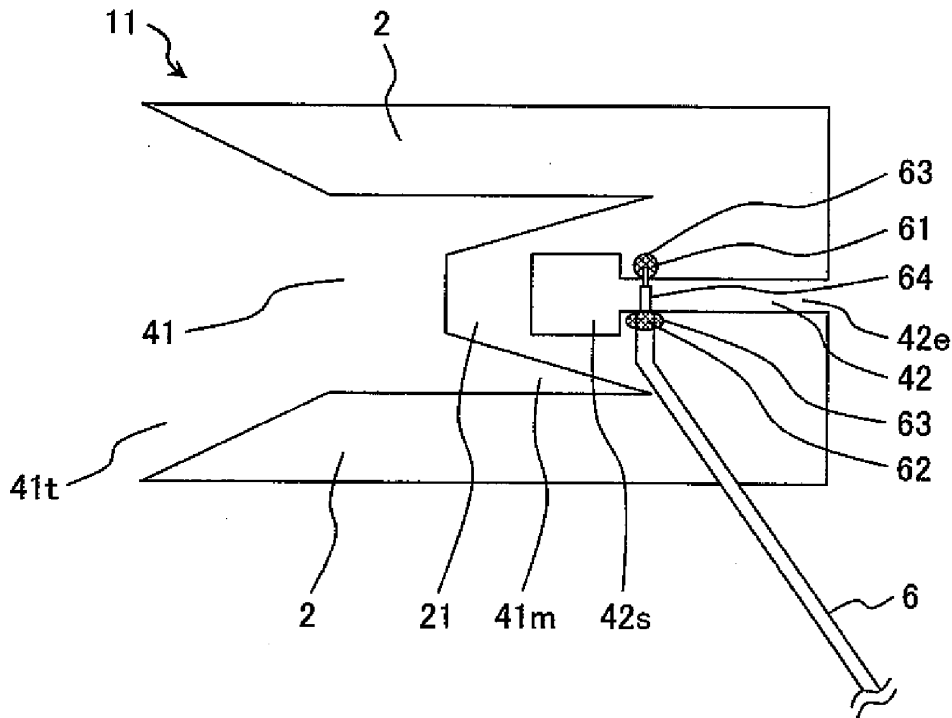
(57) **ABSTRACT**

An antenna according to the present invention comprises: a conductor plate with an axisymmetrical shape; a slot formed on the conductor plate; and a feeding point provided on the axisymmetrical axis of the conductor plate, in which the conductor plate is folded along two locations that are parallel to the axisymmetrical axis toward mutually different directions.

(73) Assignee: **Hitachi Cable, Ltd.**

(21) Appl. No.: **12/718,025**

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





US 20110057845A1

(19) **United States**

(12) **Patent Application Publication**  
**Rötter**

(10) **Pub. No.: US 2011/0057845 A1**

(43) **Pub. Date: Mar. 10, 2011**

(54) **PLANAR BROADBAND ANTENNA**

**Publication Classification**

(75) Inventor: **Gerhard Rötter, Veitsbronn (DE)**

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

(73) Assignee: **Siemens AG, Munchen (DE)**

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

(21) Appl. No.: **12/808,581**

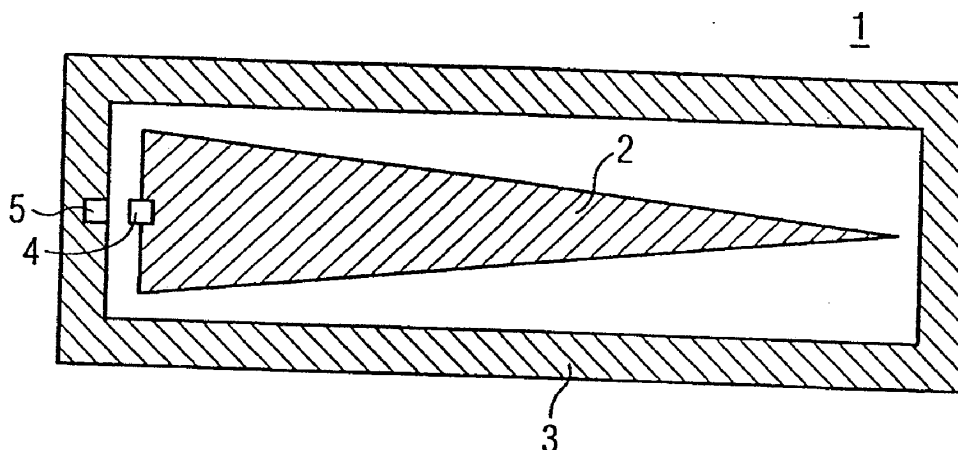
(57) **ABSTRACT**

(22) PCT Filed: **Dec. 17, 2007**

(86) PCT No.: **PCT/EP07/11068**

§ 371 (c)(1),  
(2), (4) Date: **Nov. 24, 2010**

A planar antenna comprising a planarly configured inner radiation element that is surrounded by an outer radiation element, wherein the inner and outer radiation elements each have a feed point. A continuous or discontinuous modification of the distance, which is equal in relation to a symmetrical axis of the inner radiation element, exists between the inner radiation element and the outer radiation element. The distance between the outer and the inner radiation element is different in the area of the two feed points from that in the area facing away from the feed points.







US 20110057847A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0057847 A1**

(43) **Pub. Date: Mar. 10, 2011**

(54) **MOBILE WIRELESS DEVICE**

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

(75) Inventors: **Nobuhiro Iwai**, Kanagawa (JP);  
**Yasuhiro Kitajima**, Kanagawa (JP);  
**Kenshi Horihata**, Kanagawa (JP);  
**Kenichi Sato**, Miyagi (JP);  
**Hironori Kikuchi**, Miyagi (JP)

(57) **ABSTRACT**

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

There is provided a mobile wireless device capable of preventing antenna characteristics from degrading by feeding electric power at a position hardly affected by a human body such as a hand or other body part. In the mobile wireless device, a first circuit board (101) is provided on a first chassis (110) and has a ground layer; a second circuit board (105) is provided on a second chassis (120) and has a ground layer. A ground terminal of a wireless portion (104) is connected to the ground layer of the first circuit board (101) at the same voltage level and is also electrically connected through the wireless portion (104) to a matching circuit (103). The ground layer of the second circuit board (105) is electrically connected to a hinge conducting portion (106) by electrostatic capacitance coupling. The hinge conducting portion (106) is connected through a third conduction portion (107) to a board connection portion (102) and feeds power to the wireless portion through the matching circuit (103). This enables the ground layer of the first circuit board (101), the third conduction portion (107), the hinge conducting portion (106), and the ground layer of the second circuit board (105) to function as an antenna resonating at a predetermined resonant frequency.

(21) Appl. No.: **12/863,039**

(22) PCT Filed: **Dec. 25, 2008**

(86) PCT No.: **PCT/JP2008/003977**

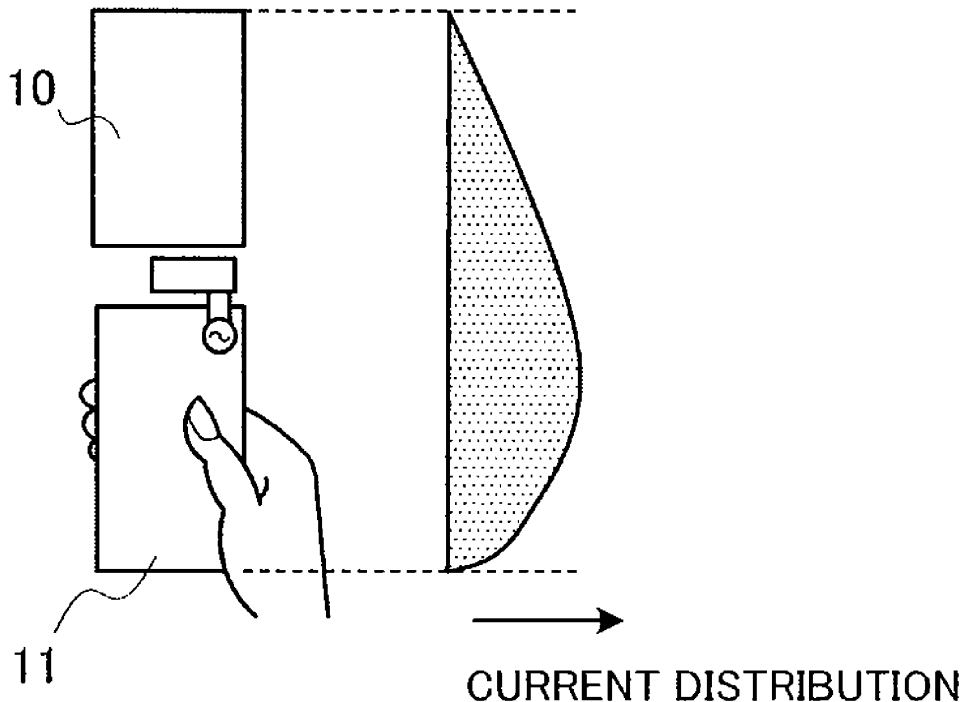
§ 371 (c)(1),  
(2), (4) Date: **Jul. 15, 2010**

(30) **Foreign Application Priority Data**

Jan. 15, 2008 (JP) ..... 2008-006001

**Publication Classification**

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





US 20110057850A1

(19) **United States**

(12) **Patent Application Publication**  
**CHEN**

(10) **Pub. No.: US 2011/0057850 A1**

(43) **Pub. Date: Mar. 10, 2011**

(54) **PRINTED ANTENNA**

**Publication Classification**

(75) Inventor: **LUNG-PAO CHEN, Tu-Cheng**  
(TW)

(51) **Int. Cl.**  
**H01Q 13/10** (2006.01)  
**H01Q 1/36** (2006.01)

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

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

(57) **ABSTRACT**

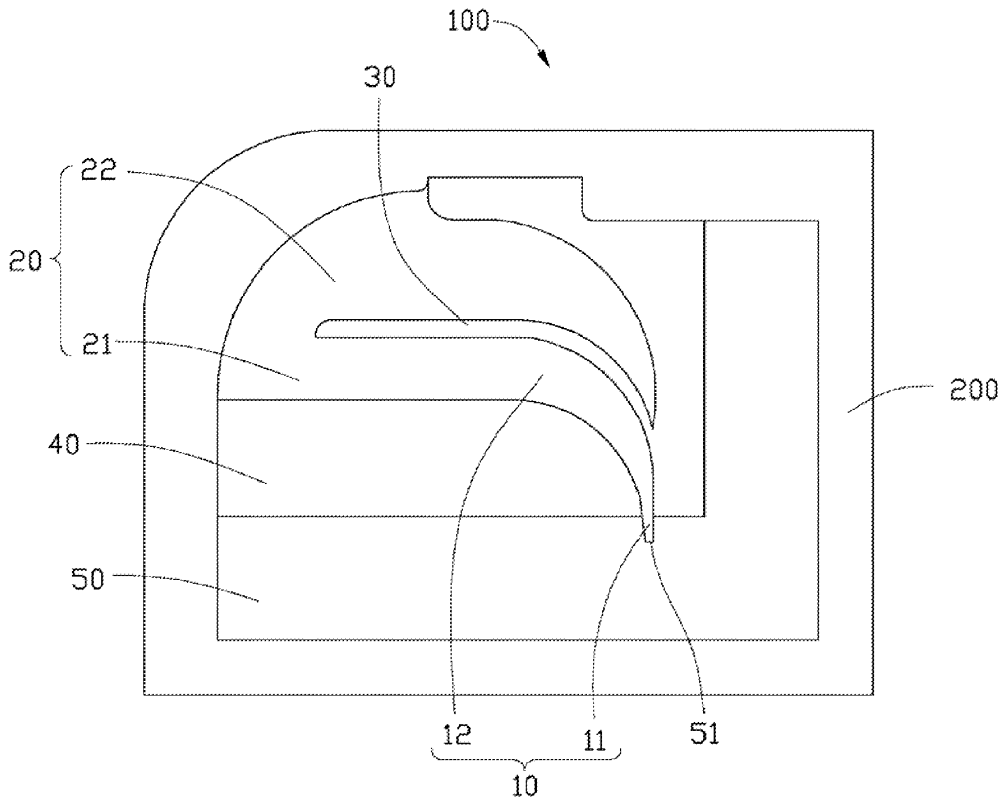
(21) Appl. No.: **12/632,928**

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

A printed antenna includes a feed portion and a radiating portion. The feed portion feeds electromagnetic signals, and includes a feed end and a connection end. A width of the feed portion is gradually increased from the feed end to the connection end. The radiating portion includes a first radiator and a second radiator. The first radiator is elongated, and connects to the connection end of the feed portion. One end of the second radiator is connected to the first radiator, and the other end is free. The free end is bend and bent along the feeding portion, and defines a slot between the second radiator and the first radiator and the feeding portion.

(30) **Foreign Application Priority Data**

Sep. 7, 2009 (CN) ..... 200920309711.1





US 20110057851A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0057851 A1**

(43) **Pub. Date: Mar. 10, 2011**

(54) **PLANAR ANTENNA AND  
ELECTROMAGNETIC BAND GAP  
STRUCTURE THEREOF**

**Publication Classification**

(51) **Int. Cl.**  
*H01Q 1/00* (2006.01)  
*H01P 1/203* (2006.01)  
*H01Q 9/16* (2006.01)

(52) **U.S. Cl.** ..... **343/793; 333/204; 343/904**

(57) **ABSTRACT**

An electromagnetic band-gap structure includes a circuit board, a ground plane and a plurality of electromagnetic band-gap units. The circuit board includes a first side and a second surface, and the ground plane disposed on the first side. The plurality of electromagnetic band-gap units are located on both the first surface and the second surface and connected to each other along an edge of the ground plane. Every electromagnetic band-gap unit includes a first strip line, a second strip line and a via. The first strip line is located on the first side, including a first relative long strip line and a first relative short strip line connected to the ground. The second strip line is located on the second side. The second strip line is connected to the first strip line of the adjacent electromagnetic band-gap unit through the via.

(75) Inventors: **Shyh-Jong CHUNG**, Hsinchu County (TW); **Ching-Wei LING**, Tainan County (TW); **Tzu-Hsien YANG**, Taipei City (TW)

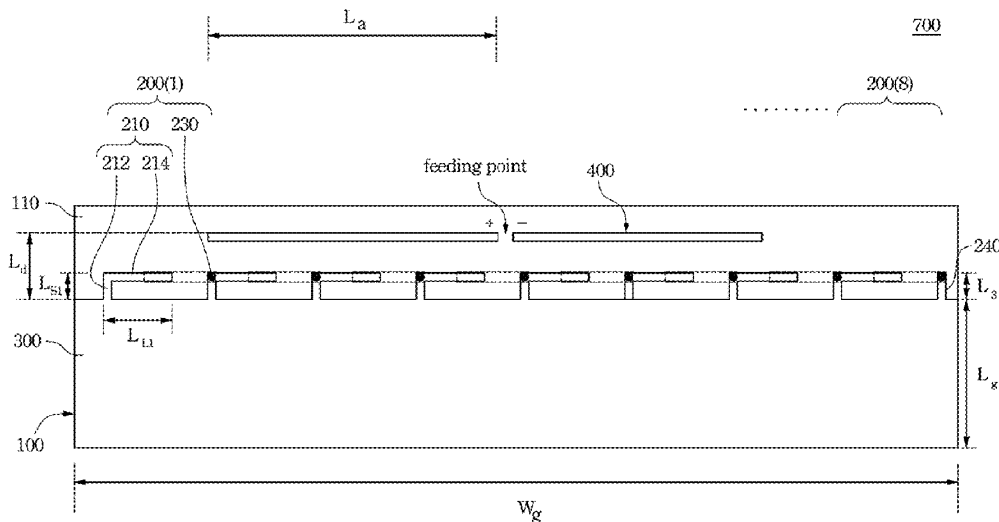
(73) Assignee: **NATIONAL CHIAO TUNG UNIVERSITY**, HSINCHU (TW)

(21) Appl. No.: **12/628,182**

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

(30) **Foreign Application Priority Data**

Sep. 8, 2009 (TW) ..... 98130267





US 20110057857A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0057857 A1**

(43) **Pub. Date: Mar. 10, 2011**

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

(52) **U.S. CL. .... 343/876**

(75) **Inventors:** Kenya Nagano, Sendai-shi (JP);  
Yoshio Koyanagi, Yokohama-shi (JP)

(57) **ABSTRACT**

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

A small antenna system which is incorporated in a portable radio apparatus and can ensure high antenna performance in a wide frequency band without impairing the design property or the operability and a portable radio apparatus are provided. An antenna device includes an antenna A1 having a resonance characteristic in a first frequency; an antenna A2 having a resonance characteristic in a second frequency and being spaced from the antenna A1 at a predetermined distance; a circuit board P provided in a mobile telephone 10, a wireless section 16 provided on the circuit board P for supplying or receiving high-frequency power; and a high-frequency switch 13 provided on the circuit board P for selecting connection of an output terminal or an input terminal of the wireless section 16 and a feeding point of the antenna A1 or the antenna A2 so that the feeding point of the antenna A1 or the antenna A2 can be switched and connecting to the wireless section 16.

(21) **Appl. No.:** 12/671,907

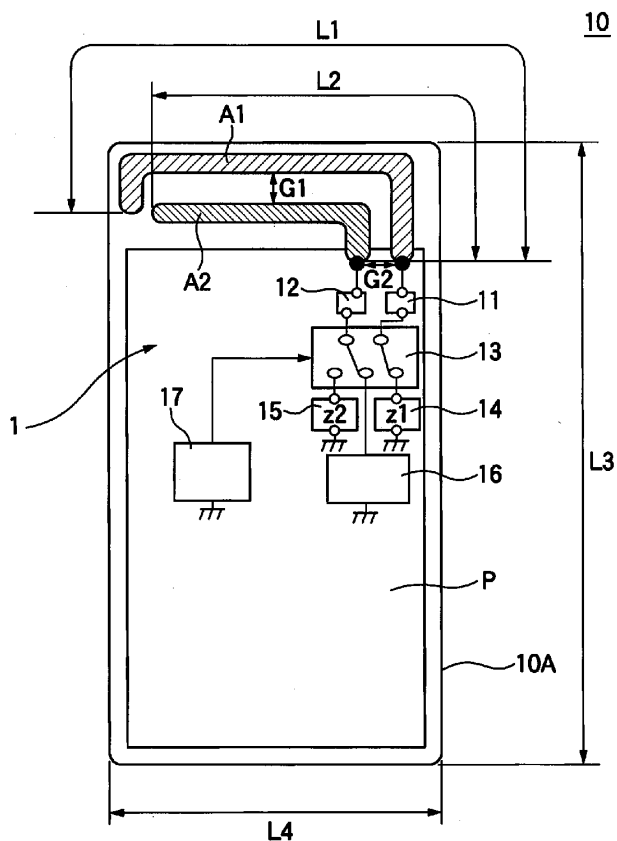
(22) **PCT Filed:** Aug. 9, 2007

(86) **PCT No.:** PCT/JP2007/065614

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

**Publication Classification**

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





US 20110057858A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0057858 A1**

(43) **Pub. Date: Mar. 10, 2011**

(54) **DEVICE HOUSING**

(30) **Foreign Application Priority Data**

(75) Inventors: **YONG YAN**, Shenzhen City (CN);  
**ZHAN LI**, Santa Clara, CA (US);  
**YONG-FA FAN**, Shenzhen City  
(CN); **ZHI-GUO ZHAO**, Shenzhen  
City (CN); **YIN MENG**, Shenzhen  
City (CN)

Sep. 10, 2009 (CN) ..... 200910306863.0

**Publication Classification**

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

(52) **U.S. Cl.** ..... **343/878**

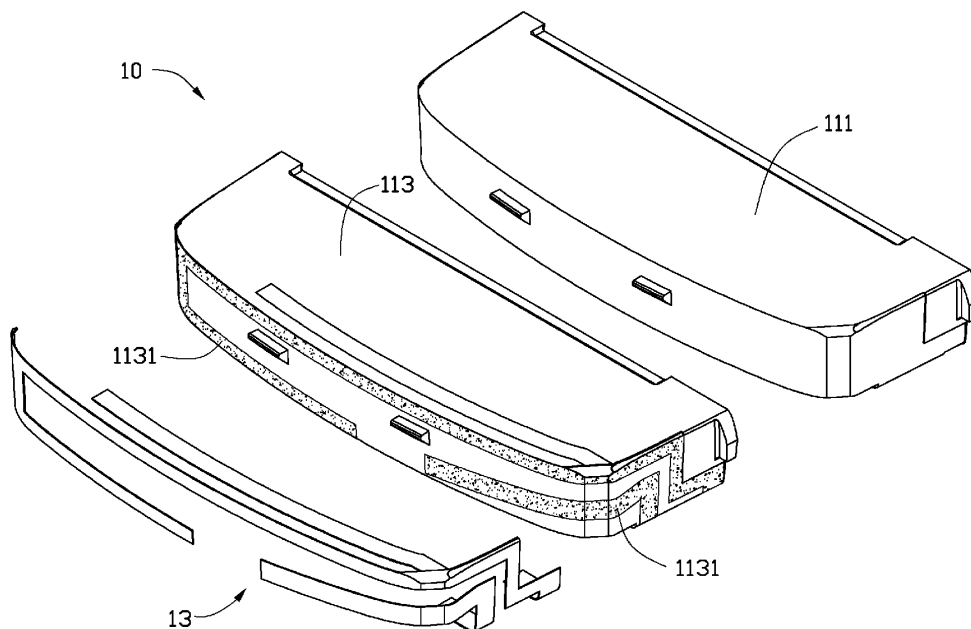
(57) **ABSTRACT**

(73) Assignees: **SHENZHEN FUTAIHONG  
PRECISION INDUSTRY CO.,  
LTD.**, ShenZhen City (CN); **FIH  
(HONG KONG) LIMITED**,  
Kowloon (HK)

A device housing comprises a main body and a three-dimensional antenna. The main body comprises a first molded body and a second molded body formed on the first molding body. The first molded body is made of plastic, the second molded body is made of plastic mixed with laser activatable additives. The second molded body has a predefined activating region formed by laser activation. The three-dimensional antenna is an electroplated coating and is formed on the predefined activating region of the second molding body.

(21) Appl. No.: **12/795,815**

(22) Filed: **Jun. 8, 2010**





US 20110057859A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0057859 A1**

(43) **Pub. Date: Mar. 10, 2011**

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

**Publication Classification**

(76) Inventors: **Sungjung RHO**, Seoul (KR);  
**Jaegon Lee**, Seoul (KR); **Ansun  
Hyun**, Seoul (KR); **Yochuol Ho**,  
Seongnam (KR); **Euntaek Jeung**,  
Anyang (KR)

(51) **Int. Cl.**  
*H01Q 21/00* (2006.01)  
*H01Q 1/50* (2006.01)  
*H01Q 5/01* (2006.01)

(52) **U.S. Cl.** ..... **343/893; 343/906**

(57) **ABSTRACT**

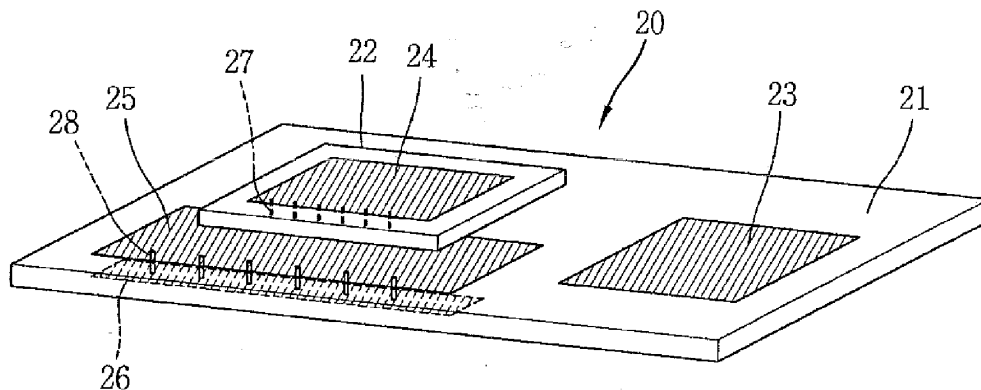
An antenna assembly includes a patch coupled to a first board, a conductive pattern coupled to a second board, a first connector electrically coupled to the patch, and a second connector to couple the conductive pattern to a circuit of the first board. The patch has a first section adjacent a first surface and a second section adjacent an opposing second surface of the second board, and the first connector electrically couples the first section to the second section of the patch. The assembly may include a plurality of antennas, and portable terminal may use the assembly to communicate in different frequency bands.

(21) Appl. No.: **12/875,604**

(22) Filed: **Sep. 3, 2010**

(30) **Foreign Application Priority Data**

Sep. 4, 2009 (KR) ..... 10-2009-0083659





US 20110063173A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0063173 A1**

(43) **Pub. Date: Mar. 17, 2011**

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

(30) **Foreign Application Priority Data**

Sep. 17, 2009 (CN) ..... 200910307142.1

(75) Inventors: **STEVEN-PHILIP MARCHER**,  
Shenzhen City (CN); **ZHAN LI**,  
Shenzhen City (CN); **YE XIONG**,  
Shenzhen City (CN); **WEI-DONG**  
**HAO**, Shenzhen City (CN)

**Publication Classification**

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

(73) Assignees: **SHENZHEN FUTAIHONG PRECISION INDUSTRY CO., LTD.**, ShenZhen City (CN); **FIH (Hong Kong) Limited**, Kowloon (HK)

(52) **U.S. Cl.** ..... **343/702; 343/700 MS; 977/742; 977/950**

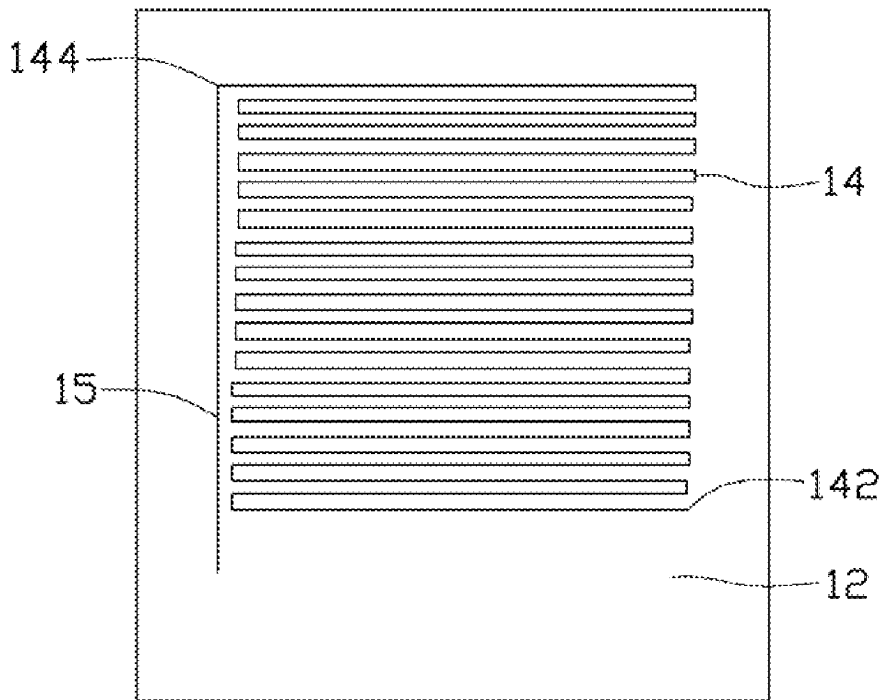
(21) Appl. No.: **12/610,485**

(57) **ABSTRACT**

(22) Filed: **Nov. 2, 2009**

An antenna module includes a radiator made of nanomaterials; the conductivity of the nanomaterials are greater than or equal to about  $5.8 \times 10^7$  S/m. The present further discloses a wireless communication device using the antenna module.

10





US 20110063174A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0063174 A1**

(43) **Pub. Date: Mar. 17, 2011**

(54) **PATCH ANTENNA AND WIRELESS COMMUNICATIONS MODULE**

(30) **Foreign Application Priority Data**

Sep. 11, 2009 (KR) ..... 10-2009-0086099

(75) Inventors: **Yun Hee CHO**, Hwaseong (KR);  
**Jong Myeon LEE**, Gwacheon (KR); **Je Hong SUNG**, Hwaseong (KR)

**Publication Classification**

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

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

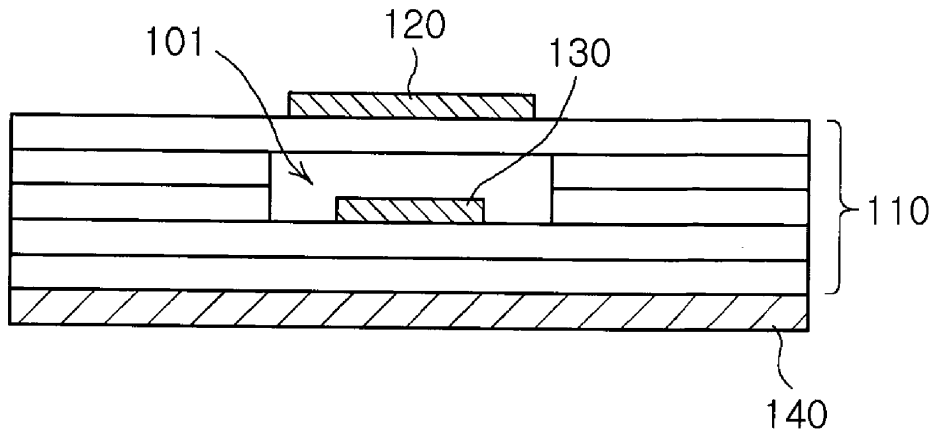
(73) Assignee: **SAMSUNG ELECTRO-MECHANICS CO., LTD.**, Suwon (KR)

(57) **ABSTRACT**

(21) Appl. No.: **12/647,610**

There is provided a patch antenna. The patch antenna includes a high dielectric constant substrate having a cavity, a radiator disposed on a portion of one surface of the high dielectric constant substrate corresponding to the cavity, a feeder line disposed on the high dielectric constant substrate and supplying a signal to the radiator, and a ground part disposed on the high dielectric constant substrate.

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







US 20110063175A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0063175 A1**

(43) **Pub. Date: Mar. 17, 2011**

(54) **PORTABLE WIRELESS DEVICE**

**Publication Classification**

(75) Inventors: **Hiroyuki Uno**, Miyagi (JP);  
**Masashi Koshi**, Miyagi (JP);  
**Tomoaki Nishikido**, Miyagi (JP);  
**Yoshio Koyanagi**, Kanagawa (JP);  
**Kenya Nagano**, Miyagi (JP)

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

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

(57) **ABSTRACT**

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

There is provided a foldable portable radio capable of exhibiting high communication performance despite its slimness and compact housings.

(21) Appl. No.: **12/992,406**

The portable radio has an upper housing 11 in which an upper circuit board 11A is placed; a lower housing 12A in which a lower circuit board 12 is placed; a conductive hinge 13A that joins the upper housing 11 to the lower housing 12 so as to be rotatable around one axis; an antenna element 14 placed in vicinity of the hinge 13A parallel to an axial direction of the hinge 13A; and a feed section 15 connected to a radio circuit 17 on the lower circuit board 12A. The antenna element 14 is electrically connected to the feed section 15, and the hinge 13A is connected as a ground, whereby the hinge 13A and the antenna element 14 operate as a dipole antenna.

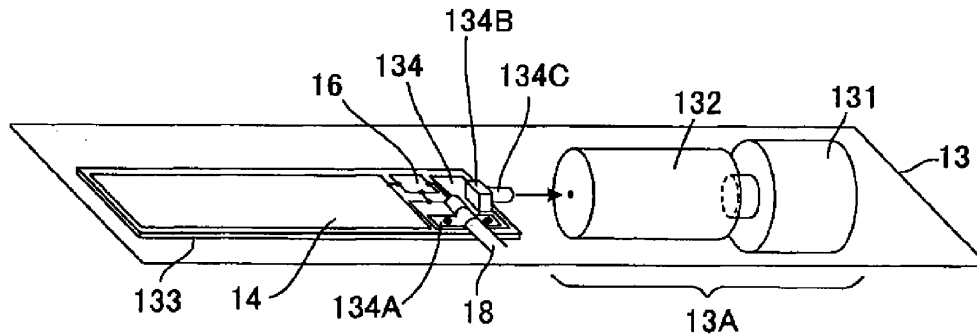
(22) PCT Filed: **Feb. 23, 2009**

(86) PCT No.: **PCT/JP2009/000768**

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

(30) **Foreign Application Priority Data**

May 14, 2008 (JP) ..... 2008-127113





US 20110063190A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0063190 A1**

(43) **Pub. Date: Mar. 17, 2011**

(54) **DEVICE AND METHOD FOR CONTROLLING AZIMUTH BEAMWIDTH ACROSS A WIDE FREQUENCY RANGE**

**Publication Classification**

(51) **Int. Cl.**  
**H01Q 15/14** (2006.01)  
**H01P 11/00** (2006.01)

(52) **U.S. Cl.** ..... **343/912; 29/600**

(57) **ABSTRACT**

A system and method for providing a compact azimuth beamwidth in a wide band antenna. The system comprises a first radiating element disposed above a ground plane and one or more parasitic elements disposed proximate to and/or around the first radiating element. Each of the parasitic elements has a slot formed therein that is configured to control beamwidth across a specific frequency range. In one embodiment, the parasitic elements and the slots can be configured to control beamwidth across different frequency ranges. And in another embodiment, another parasitic element is disposed within the slots to control beamwidth across another frequency range.

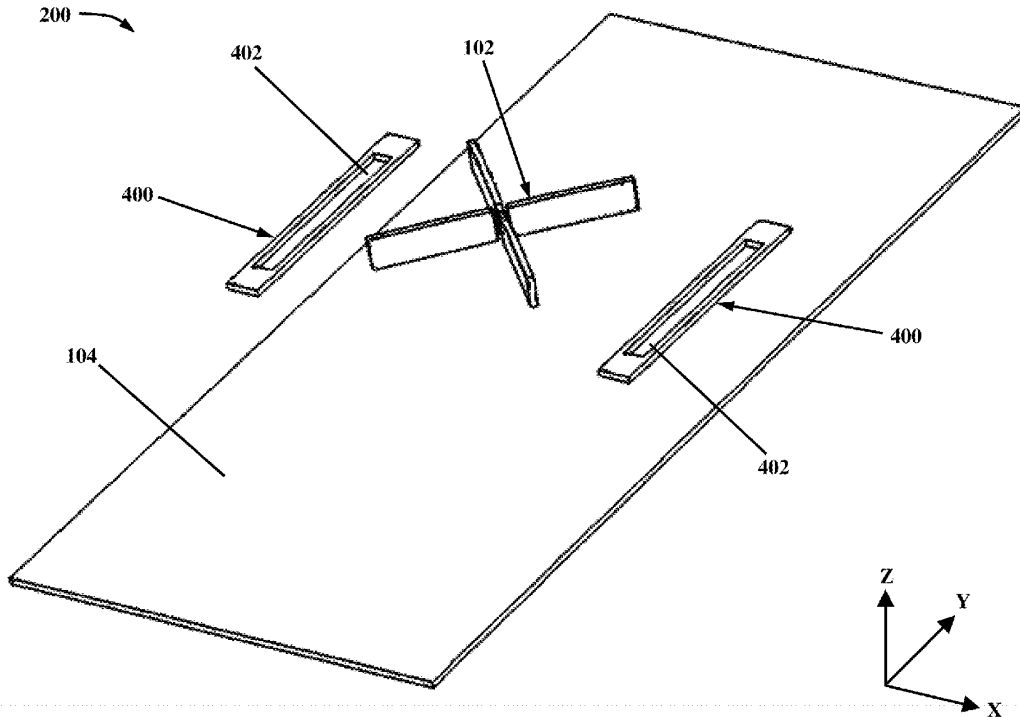
(76) **Inventors:** **Jimmy HO**, Chatham Kent (GB); **Simon Christopher R. Munday**, Corby (GB); **Charanjit Sailopal**, Hitchin (GB); **David Harold Boardman**, Ipswich (GB); **Barry John Talbot**, Rugby (GB); **Michal Klinkosz**, Wellingborough (GB)

(21) **Appl. No.:** **12/869,429**

(22) **Filed:** **Aug. 26, 2010**

**Related U.S. Application Data**

(60) Provisional application No. 61/237,060, filed on Aug. 26, 2009.





US 20110063779A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0063779 A1**

(43) **Pub. Date: Mar. 17, 2011**

(54) **PORTABLE WIRELESS DEVICE**

(52) **U.S. Cl. .... 361/679.01**

(75) **Inventors: Takahiro Ochi, Sendai-shi (JP); Haruhiko Kakitsu, Sendai-shi (JP)**

(57) **ABSTRACT**

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

A portable wireless device has no externally projecting part even when a card type functional medium has been therein inserted, and allows downsizing and obtaining high antenna performance.

(21) **Appl. No.: 12/672,988**

The portable wireless device includes a card slot (12) in a substrate (11) of a lower housing (10), and includes a slot cover (13) that can block an opening portion of the card slot (12). The slot cover (13) is integrally provided with a parasitic element (14). The parasitic element (14) is, when an SDIO card (100) is inserted, arranged so as to be in proximity substantially parallel with the antenna element (102) of the SDIO card (100), has an electrical length which is approximately one-half wavelength of a driving frequency of an RF circuit (101) of the SDIO card (100), and electromagnetically couples with the antenna element (102) to operate as a parasitic element.

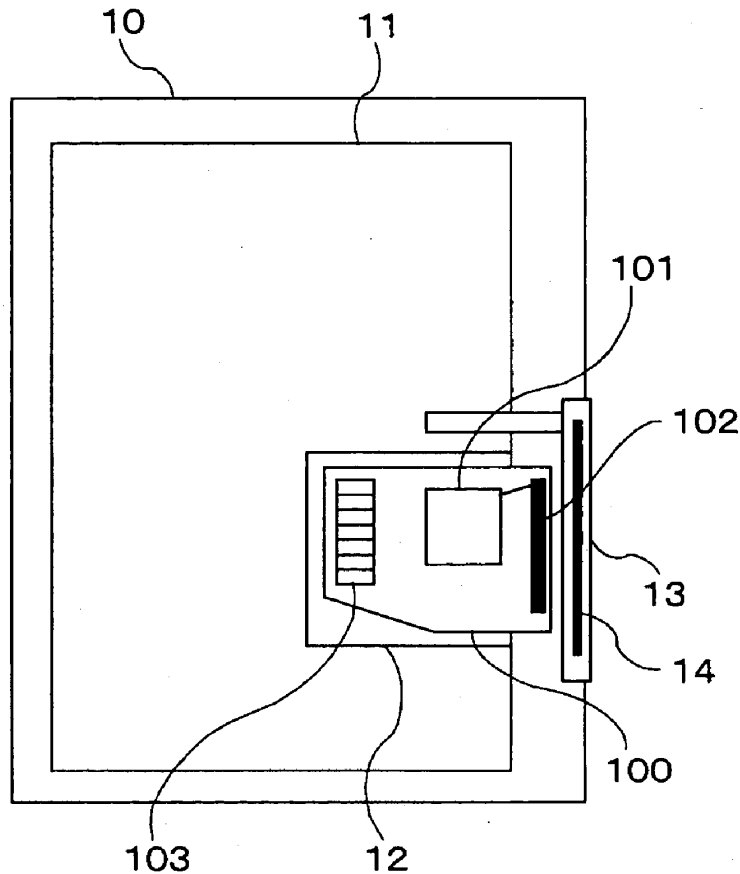
(22) **PCT Filed: Aug. 10, 2007**

(86) **PCT No.: PCT/JP2007/065746**

§ 371 (c)(1),  
(2), (4) **Date: Feb. 10, 2010**

**Publication Classification**

(51) **Int. Cl. H05K 7/00 (2006.01)**





US 20110065383A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0065383 A1**

(43) **Pub. Date: Mar. 17, 2011**

(54) **FOCUSED ANTENNA, MULTI-PURPOSE ANTENNA, AND METHODS RELATED THERETO**

(75) Inventors: **Stephen Frankland**, Horsham (GB); **John Hillan**, Alton (GB)

(73) Assignee: **QUALCOMM INCORPORATED**, San Diego, CA (US)

(21) Appl. No.: **12/852,080**

(22) Filed: **Aug. 6, 2010**

**Related U.S. Application Data**

(60) Provisional application No. 61/242,295, filed on Sep. 14, 2009, provisional application No. 61/242,275, filed on Sep. 14, 2009.

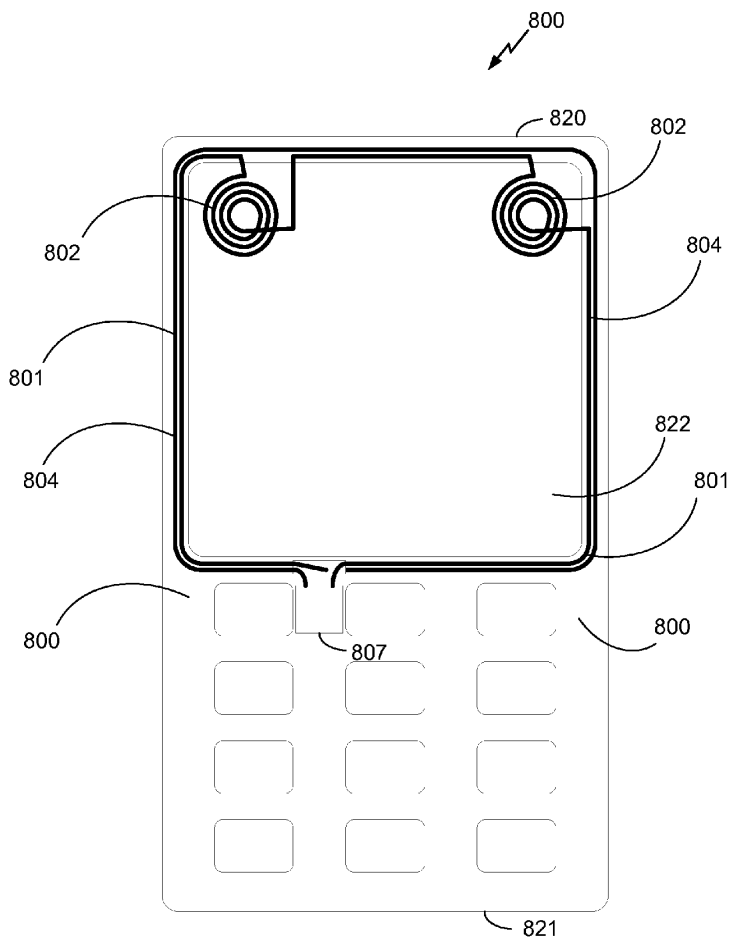
**Publication Classification**

(51) **Int. Cl.**  
*H04B 5/00* (2006.01)  
*H01Q 1/36* (2006.01)  
*H01Q 7/00* (2006.01)  
*H01Q 21/00* (2006.01)  
*H02J 17/00* (2006.01)

(52) **U.S. Cl.** ..... **455/41.1**; 343/700 MS; 343/895; 343/866; 343/893; 343/867; 307/104

(57) **ABSTRACT**

Exemplary embodiments are directed to a device including a focused antenna. A device may include a minor plane surface and an antenna positioned proximate the minor plane surface. The antenna may be configured for generating a field focused around the minor plane surface. The antenna may further include an element extending from the minor plane surface toward another minor plane surface of the device.





US 20110065477A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0065477 A1**

(43) **Pub. Date: Mar. 17, 2011**

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

**Publication Classification**

(75) Inventors: **Kyung-Bae KO**, Gyeonggi-do (KR); **Jung-Ho PARK**, Gyeonggi-do (KR); **Austin KIM**, Gyeonggi-do (KR); **Dong-Hwan KIM**, Gyeonggi-do (KR); **Yong-Jin KIM**, Seoul (KR); **Ja-Ho LEE**, Gyeonggi-do (KR); **Se-Ho KIM**, Gangwon-do (KR)

(51) **Int. Cl.**  
*H04M 1/00* (2006.01)  
*H01Q 1/50* (2006.01)  
*H01Q 3/24* (2006.01)  
*H01Q 9/04* (2006.01)  
(52) **U.S. Cl.** ..... **455/562.1**; 343/860; 343/876; 343/700 MS

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

(57) **ABSTRACT**

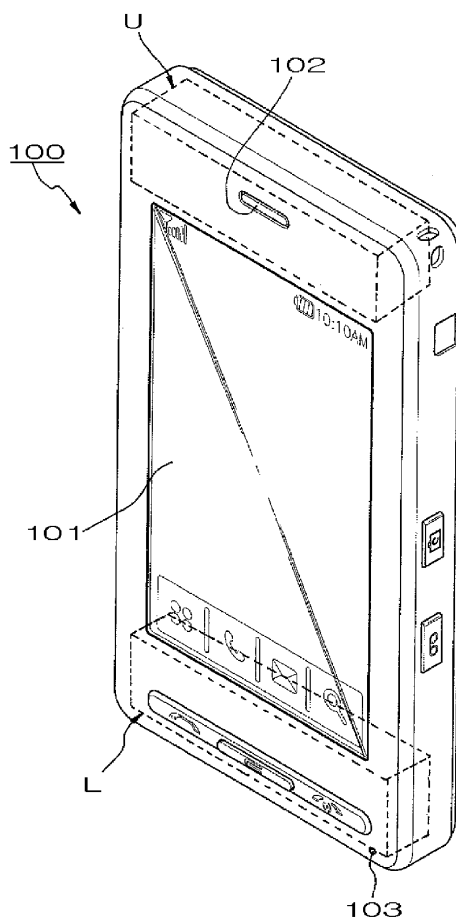
(21) Appl. No.: **12/881,250**

A multiband built-in antenna for a portable terminal is provided, which includes a feeding part electrically connected to a Radio Frequency (RF) connector of a terminal main board; an antenna radiator comprising at least two ground parts electrically connected to a ground means of the terminal and formed at different locations; and a switching means commonly linked to a ground line of each ground part of the antenna radiator, and selectively connecting one or more of the at least two ground parts electrically to the ground means according to a switching operation

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

(30) **Foreign Application Priority Data**

Sep. 16, 2009 (KR) ..... 10-2009-0087416





US 20110068982A1

(19) **United States**

(12) **Patent Application Publication**  
LIN

(10) **Pub. No.: US 2011/0068982 A1**

(43) **Pub. Date: Mar. 24, 2011**

(54) **CIRCULARLY POLARIZED ANTENNA AND MANUFACTURING METHOD THEREOF**

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

(57) **ABSTRACT**

(76) Inventor: **Yuan-Chih LIN**, Hsinchu (TW)

A circularly polarized antenna and a manufacturing method thereof. The manufacturing method includes disposing a radiation metal sheet and a ground metal sheet on a top and bottom surfaces of a substrate, respectively, disposing a metal microstrip comprising a first and a second metal microstrip segment on corner regions of the top and bottom surfaces of the substrate and a third metal microstrip segment on a side wall of the substrate, wherein the third metal microstrip segment is electrically connected to the first metal microstrip segment and the second metal microstrip segment, connecting one end of a signal-fed component to a system ground unit, connecting the other end of the signal-fed component to the second metal microstrip segment, and regulating dimensions and locations of the radiation metal sheet, the ground metal sheet, the second metal microstrip segment and/or the first metal microstrip segment so as to optimize signal characteristic of the circularly polarized antenna.

(21) Appl. No.: **12/883,711**

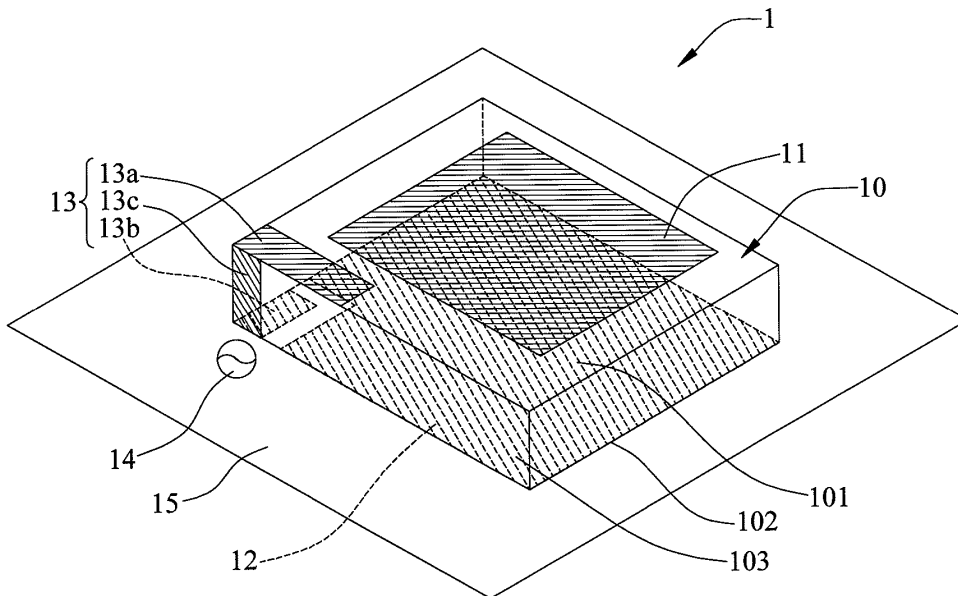
(22) Filed: **Sep. 16, 2010**

(30) **Foreign Application Priority Data**

Sep. 21, 2009 (TW) ..... 98131798

**Publication Classification**

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





US 20110068985A1

(19) **United States**

(12) **Patent Application Publication**  
**HILLERSBORG**

(10) **Pub. No.: US 2011/0068985 A1**

(43) **Pub. Date: Mar. 24, 2011**

(54) **PORTABLE COMMUNICATION DEVICE  
COMPRISING AN ANTENNA**

**Publication Classification**

(75) Inventor: **Per HILLERSBORG**, Solrod  
Strand (DK)

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

(73) Assignee: **SENNHEISER  
COMMUNICATIONS A/S**, Solrod  
Strand (DK)

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

(21) Appl. No.: **12/886,044**

(57) **ABSTRACT**

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

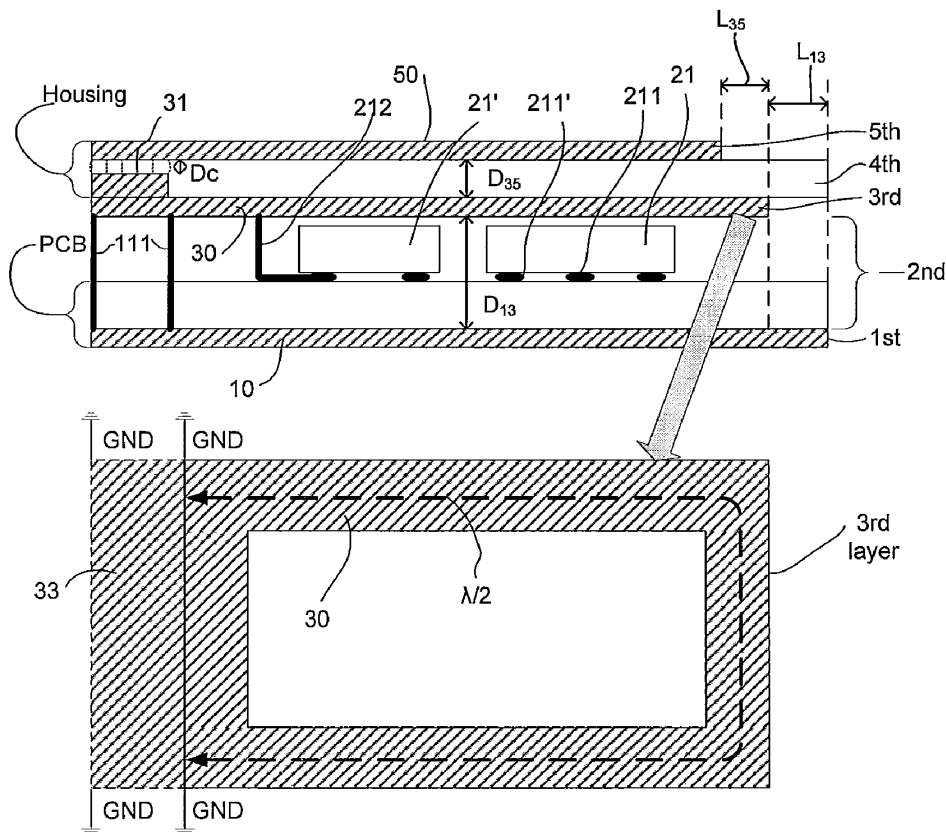
The invention relates to a communication device comprising a wireless interface for enabling wireless transmission and/or reception at a predefined wavelength  $\lambda_c$  to be established. The object of the present invention is to provide an antenna suitable for wireless communication in a portable communication device. The problem is solved in that the communication device comprises a housing having an electrically conductive part, the wireless interface comprising an antenna comprising a first quarter wavelength patch and a ground plane comprising an electrically conductive material, the first quarter wavelength patch being at least partially constituted by said electrically conductive part of the housing. This has the advantage of providing an alternative wireless interface for a communication device. The invention may e.g. be used in portable communication devices with a wireless interface for communication with another device, in particular in a headset or a headphone or an active earplug.

**Related U.S. Application Data**

(60) Provisional application No. 61/244,091, filed on Sep. 21, 2009.

**Foreign Application Priority Data**

(30) Sep. 21, 2009 (EP) ..... 09170802.4





US 20110068990A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0068990 A1**

(43) **Pub. Date: Mar. 24, 2011**

(54) **SURFACE-MOUNTABLE ANTENNA WITH WAVEGUIDE CONNECTOR FUNCTION, COMMUNICATION SYSTEM, ADAPTOR AND ARRANGEMENT COMPRISING THE ANTENNA DEVICE**

**Publication Classification**

(51) **Int. Cl.**  
*H01Q 13/00* (2006.01)  
*H01Q 1/00* (2006.01)  
*H01Q 1/50* (2006.01)

(52) **U.S. Cl.** ..... 343/772

(57) **ABSTRACT**

Planar antenna device (100) aimed to be integrated onto a common substrate (30) preferably for millimeter wave applications. The antenna device (100) comprises a reflector frame (10) with at least partially metallised sidewalls (12) and a lateral opening (14) for the feedpoint (24) of a mode conversion element (20). The mode conversion element (20) is mounted on a support structure (13) provided by said reflector frame (10). The feedpoint (24) enables the mode conversion element (20) to be connected to other components. An adaptor with a lower portion designed to be connectable to the upper horizontal opening (11) of the antenna device (100) may be used to accommodate various testing and tuning equipment.

(76) **Inventors:** **Janusz Grzyb**, Hilden (DE);  
**Uhland Goebel**, Senden (DE)

(21) **Appl. No.:** **12/988,003**

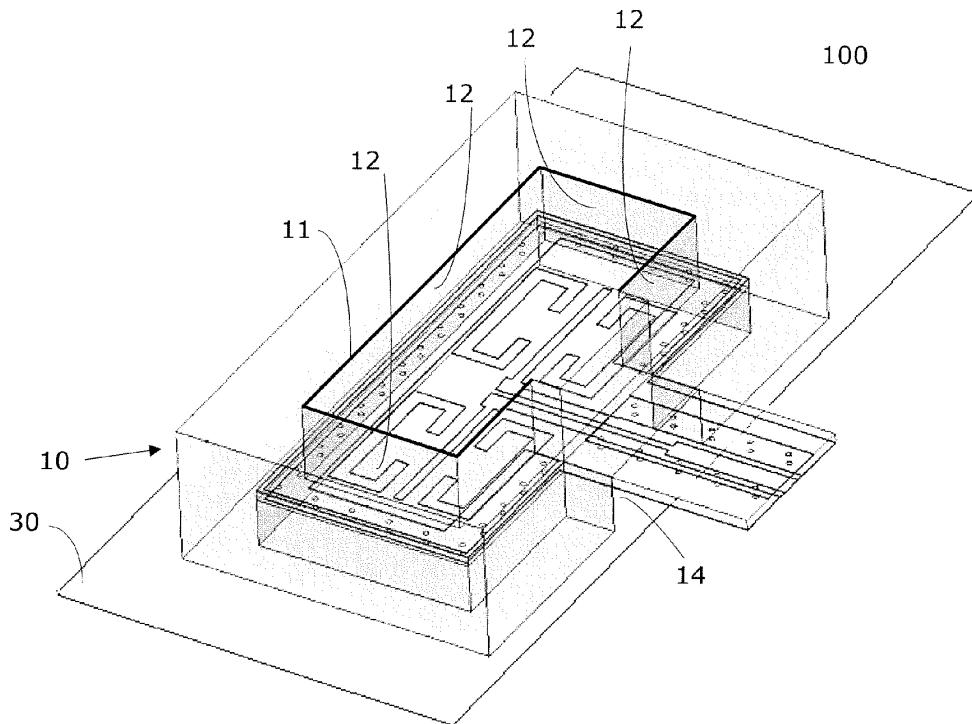
(22) **PCT Filed:** **Mar. 24, 2009**

(86) **PCT No.:** **PCT/EP2009/053428**

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

(30) **Foreign Application Priority Data**

Apr. 15, 2008 (EP) ..... 08154524.6







US 20110068991A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0068991 A1**

(43) **Pub. Date: Mar. 24, 2011**

(54) **MAGNETODIELECTRIC SUBSTRATE AND ANTENNA APPARATUS USING THE SAME**

**Publication Classification**

(75) Inventors: **Soo-Yong JANG**, Daegu (KR);  
**Austin KIM**, Gyeonggi-do (KR);  
**Jae-Ho LEE**, Gyeonggi-do (KR);  
**Young-Soon LEE**, Gyeongbuk (KR);  
**Ui-Jung KIM**, Gyeongbuk (KR)

(51) **Int. Cl.**  
**H01Q 1/00** (2006.01)  
**H05K 1/00** (2006.01)

(52) **U.S. Cl.** ..... **343/787; 174/258**

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

(57) **ABSTRACT**

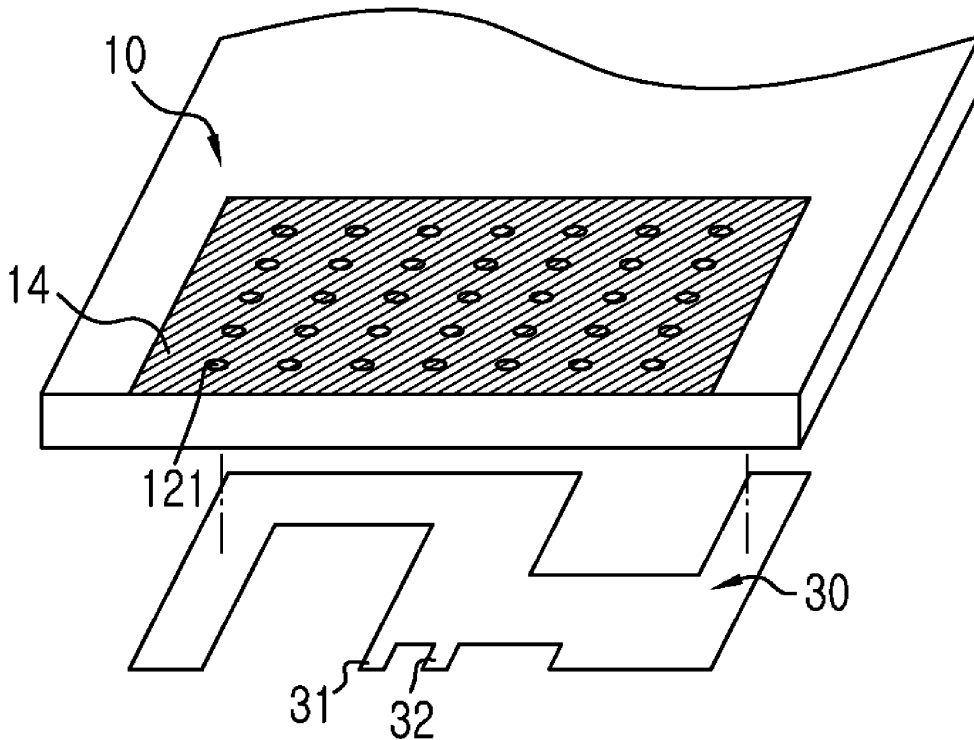
A magnetodielectric substrate includes a first dielectric layer, a second dielectric layer, conductive patterns, and a plurality of air vias. The first dielectric layer has a predetermined height, and the second dielectric layer is stacked on the first dielectric layer. Conductive patterns are coated on an upper surface and a lower surface of one of the first and second dielectric layers. A plurality of air vias is formed with a predetermined diameter and a predetermined interval such that they pass through up to the conductive patterns of the upper and lower surfaces from the dielectric layer on which the conductive patterns are coated.

(21) Appl. No.: **12/878,268**

(22) Filed: **Sep. 9, 2010**

(30) **Foreign Application Priority Data**

Sep. 23, 2009 (KR) ..... 10-2009-0089954





US 20110068992A1

(19) **United States**

(12) **Patent Application Publication**  
**Payne**

(10) **Pub. No.: US 2011/0068992 A1**

(43) **Pub. Date: Mar. 24, 2011**

(54) **CROSS-DIPOLE ANTENNA CONFIGURATIONS**

**Publication Classification**

(75) Inventor: **William Ernest Payne**, Dallas, GA (US)

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

(52) **U.S. Cl.** ..... **343/797**

(73) Assignee: **Venti Group, LLC**, Laguna Hills, CA (US)

(57) **ABSTRACT**

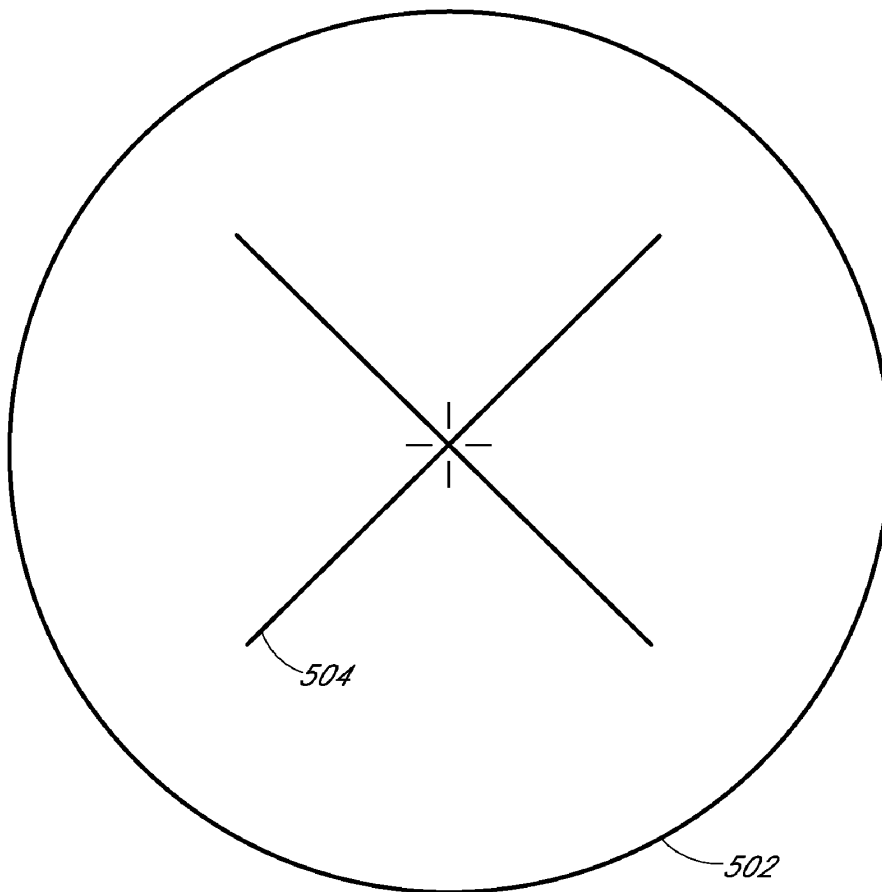
(21) Appl. No.: **12/841,048**

(22) Filed: **Jul. 21, 2010**

An apparatus has an improved antenna pattern for a cross dipole antenna. Such antennas desirably have an omnidirectional antenna pattern. Conventional cross dipole antennas exhibit nulls in their antenna patterns, which can cause antennas to deviate from a standard or specification. Applicant recognized and confirmed that the connection of a coaxial cable to the antenna arms is a cause of the nulls in the antenna pattern, and has devised techniques disclosed herein to compensate or cancel the effects of the connection. In one embodiment, the arms of the cross dipole antenna that are coupled to a center conductor of the coaxial cable remain of conventional length, but the arms of the cross dipole antenna that are coupled to a shield of the coaxial cable are lengthened by a fraction of the radius of the outer diameter of the coaxial cable.

**Related U.S. Application Data**

(63) Continuation-in-part of application No. 12/784,992, filed on May 21, 2010, which is a continuation of application No. 12/534,703, filed on Aug. 3, 2009.





US 20110068994A1

(19) **United States**

(12) **Patent Application Publication**  
**MATSUOKA**

(10) **Pub. No.: US 2011/0068994 A1**

(43) **Pub. Date: Mar. 24, 2011**

(54) **COMMUNICATION MODULE,  
COMMUNICATION APPARATUS**

**Publication Classification**

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

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

(57) **ABSTRACT**

(75) **Inventor:** **Yasuharu MATSUOKA**, Osaka  
(JP)

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

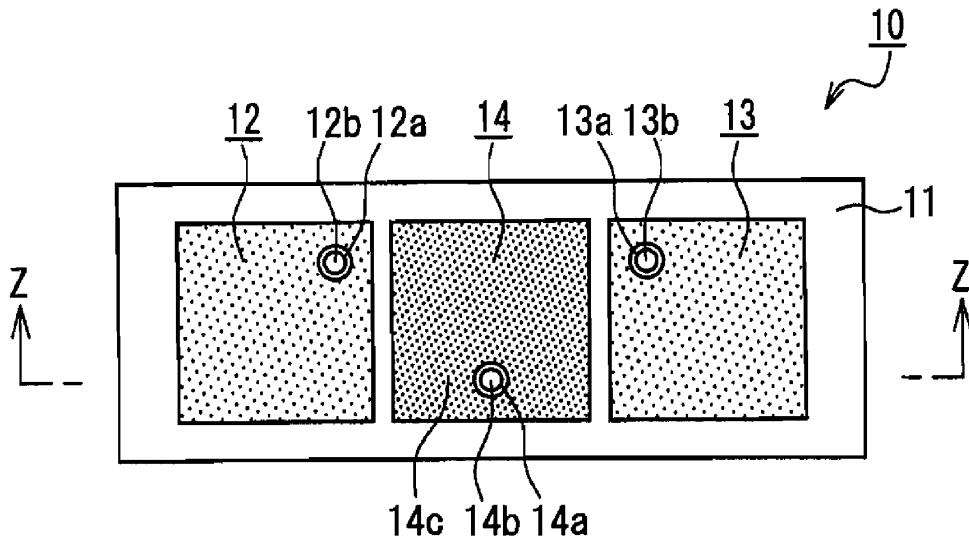
(21) **Appl. No.:** **12/872,295**

(22) **Filed:** **Aug. 31, 2010**

(30) **Foreign Application Priority Data**

Sep. 18, 2009 (JP) ..... JP2009-217654

A communication module of the present application includes a first antenna element 12, a second antenna element 13, and a ground portion 14. The first antenna element 12 and the second antenna element 13 can transmit and receive radio signals. The ground portion 14 is provided between the first antenna element 12 and the second antenna element 13 and can suppress electrical interference between the first antenna element 12 and the second antenna element 13. The ground portion 14 is a ground potential. Thus, the unwanted radio waves leaking from the first antenna element 12 and the second antenna element 13 are grounded electrically, so that the degradation of isolation can be suppressed.





US 20110068995A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0068995 A1**

(43) **Pub. Date: Mar. 24, 2011**

(54) **SLOTTED GROUND-PLANE USED AS A SLOT ANTENNA OR USED FOR A PIFA ANTENNA**

(30) **Foreign Application Priority Data**

Mar. 15, 2005 (EP) ..... 05005540.9

(76) Inventors: **Carles Puente Baliarda**, Barcelona (ES); **Jaime Anguera Pros**, Castellon (ES)

**Publication Classification**

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

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

(21) Appl. No.: **12/958,522**

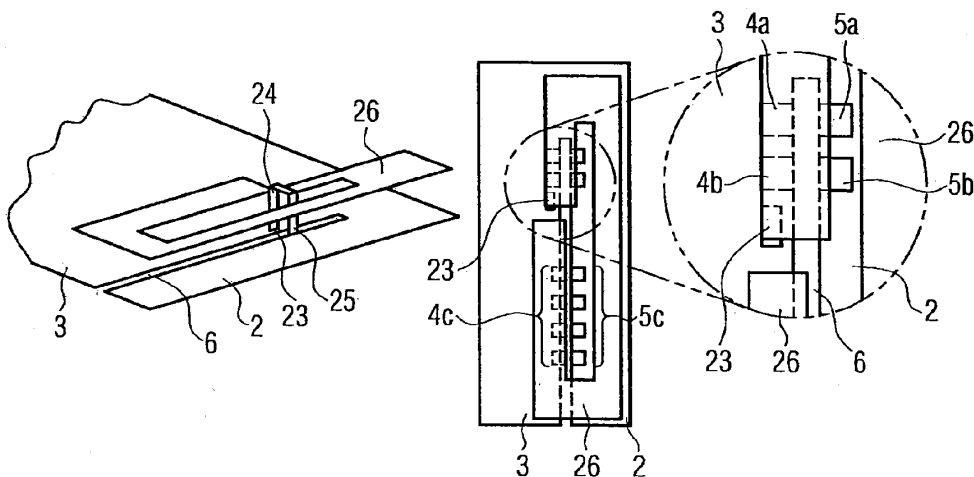
(57) **ABSTRACT**

(22) Filed: **Dec. 2, 2010**

**Related U.S. Application Data**

(63) Continuation of application No. 11/884,991, filed on Sep. 20, 2007, now Pat. No. 7,872,605, filed as application No. PCT/EP06/60766 on Mar. 15, 2006.

A wireless device includes a ground plane with at least two portions. On each of the at least two portions at least one connecting means is provided. The two connecting means are connected with an electric component for connecting the at least two portions of the ground plane. The ground plane is partially covered with an insulating material and the connecting means are given by a part of the ground plane which is not covered by any insulating material.





US 20110068996A1

(19) **United States**

(12) **Patent Application Publication**  
**Flores-Cuadras et al.**

(10) **Pub. No.: US 2011/0068996 A1**

(43) **Pub. Date: Mar. 24, 2011**

(54) **MULTI-ANGLE ULTRA WIDEBAND  
ANTENNA WITH SURFACE MOUNT  
TECHNOLOGY**

(52) **U.S. CL.** ..... 343/893; 29/601; 343/700 MS

(75) **Inventors:** **Javier Ruben Flores-Cuadras**, Los Mochis-Ahome (MX); **Dermot O'Shea**, Enniscorthy (IE); **Ronan Quinlan**, Dublin (IE)

(57) **ABSTRACT**

(73) **Assignee:** **Taoglas Limited**, County Wexford (IE)

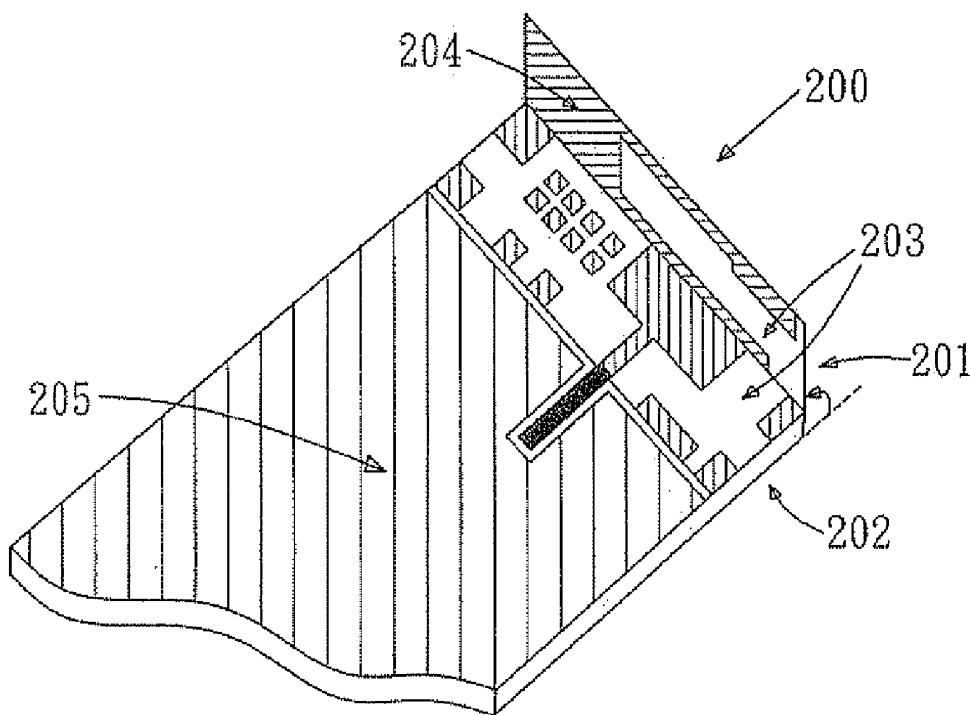
A multi-angle ultra wide band antenna for electronic devices is disclosed. The said antenna cover all mobile bands worldwide: 700/850/900/1700/1800/1900 and 2100 MHz and with sufficient bandwidth to include the 2400 and 2500 MHz mainly used in wireless networks, having a radiated element supported by a first substrate and expanding into a spatial geometry for transmission and reception of radio signal. An antenna base has a plurality of first solder pads on a second substrate for physical attachment to a printed circuit board and a second solder pad electrically connected to a terminal of said antenna to radio circuitry feed point, with compatible surface mount technology. The first and second substrates are joined by a bending line as a single substrate, where the said first substrate is allowed to be bent relative to the plane of the said second substrate.

(21) **Appl. No.:** **12/566,199**

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

**Publication Classification**

(51) **Int. Cl.**  
**H01Q 1/38** (2006.01)  
**H01P 11/00** (2006.01)  
**H01Q 21/00** (2006.01)





US 20110068997A1

(19) **United States**

(12) **Patent Application Publication**  
**Barone**

(10) **Pub. No.: US 2011/0068997 A1**

(43) **Pub. Date: Mar. 24, 2011**

(54) **XYZ ISOTROPIC RADIATOR ANTENNA**

**Publication Classification**

(76) Inventor: **James V. Barone**, Millersville, MD (US)

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

(21) Appl. No.: **12/702,607**

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

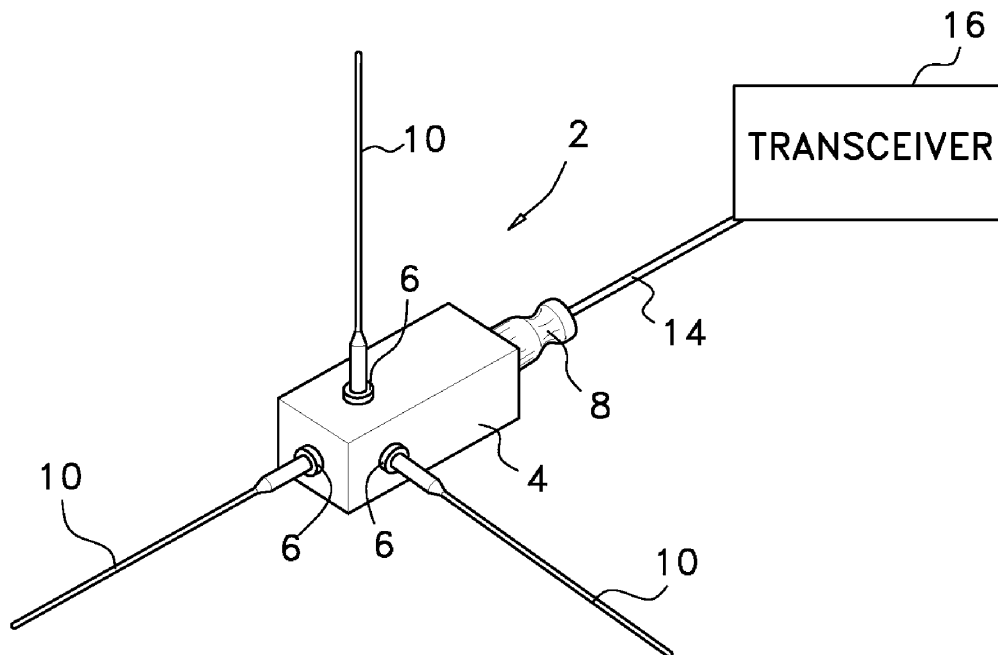
(22) Filed: **Feb. 9, 2010**

(57) **ABSTRACT**

**Related U.S. Application Data**

(63) Continuation-in-part of application No. 11/480,737, filed on Aug. 9, 2006, now abandoned.

An XYZ isotropic radiator antenna is characterized by three whip antennas connected with a housing and arranged 90 degrees perpendicular to each other. The antenna generates a heliocentric spherical radiation pattern which allows the antenna to transmit and receive radio frequency signals in any direction or plane.





US 20110074636A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0074636 A1**

(43) **Pub. Date: Mar. 31, 2011**

(54) **MULTI-BAND ANTENNA**

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

(57) **ABSTRACT**

(76) **Inventors: Yung-Chih Tsai, Taipei (TW); Kai Shih, Taipei (TW); Jia-Hung Su, Taipei (TW)**

A multi-band antenna has a strip-shaped first radiating portion disposed levelly. An end of a long side of the first radiating portion is extended downwardly to form a first grounding portion. A strip-shaped second radiating portion is disposed in alignment with and spaced from the first radiating portion. A long side of the second radiating portion is extended downwards to form a feeding portion at an end thereof away from the first radiating portion. A third radiating portion, which is stretched levelly and oppositely from an end of the second radiating portion adjacent to the feeding portion, is longer than the second radiating portion and has a long side extended downwardly to form a fixing portion adjacent to a free end thereof. The feeding portion and the fixing portion are located at the same side as the first grounding portion with respect to the first, second and third radiating portion.

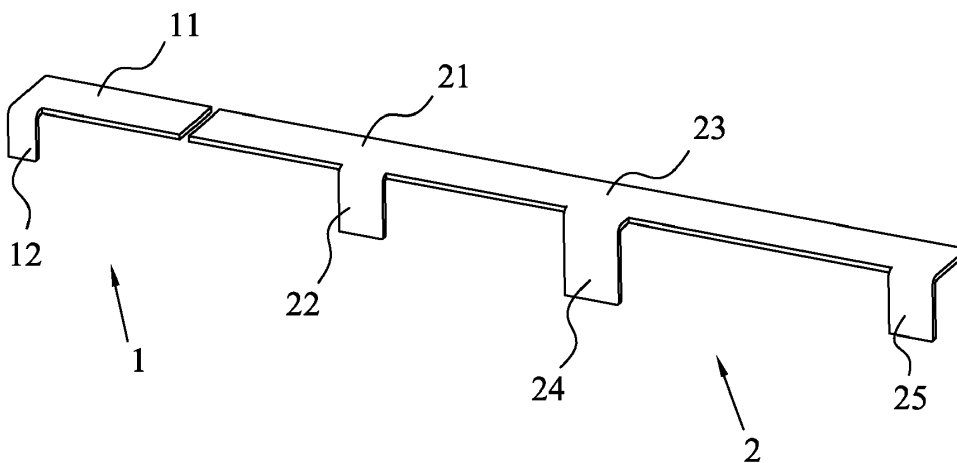
(21) **Appl. No.: 12/568,674**

(22) **Filed: Sep. 29, 2009**

**Publication Classification**

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

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US 20110074637A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0074637 A1**

(43) **Pub. Date: Mar. 31, 2011**

(54) **ANTENNA AND COMMUNICATION DEVICE**

**Publication Classification**

(75) Inventors: **Naoki Sotoma**, Tokyo (JP);  
**Hideaki Shimoda**, Tokyo (JP);  
**Toshihiro Tsuru**, Tokyo (JP)

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

(73) Assignee: **TDK CORPORATION**, Tokyo (JP)

(57) **ABSTRACT**

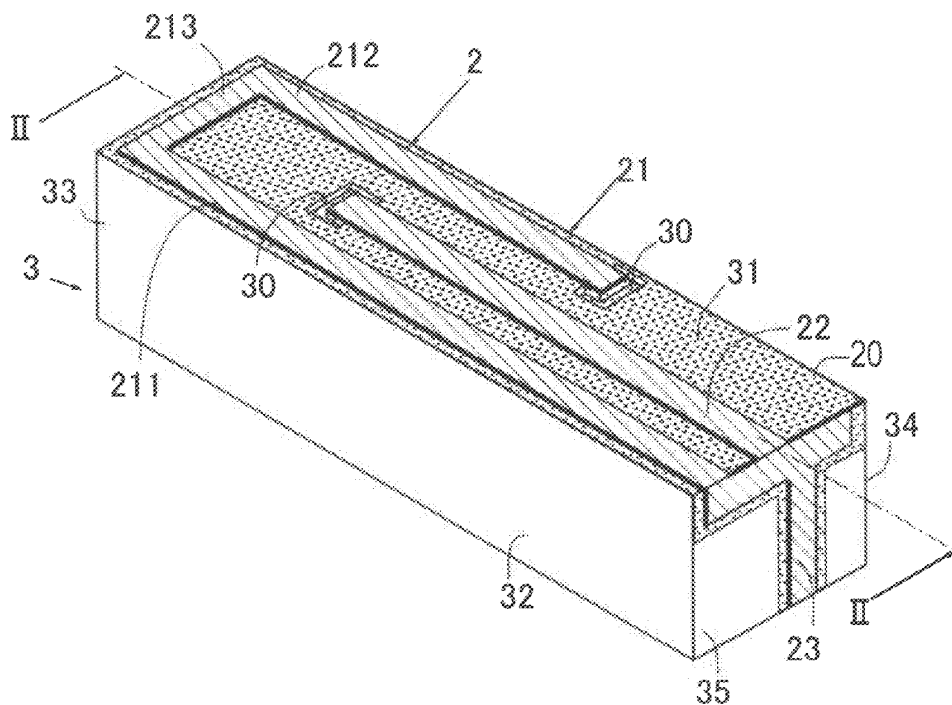
(21) Appl. No.: **12/880,713**

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

An antenna includes a dielectric substrate and an antenna element, wherein the dielectric substrate has a mark on an outer surface, the mark having a lower relative permittivity than the dielectric substrate, the antenna element is formed from a FPC film, and the FPC film has an antenna electrode on one side and a flexible insulating film with an adhesive layer on the other side and is adhered to the outer surface of the dielectric substrate with a tip or bend of the antenna electrode aligned with the mark.

(30) **Foreign Application Priority Data**

Sep. 29, 2009 (JP) ..... 2009-225412







US 20110074638A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0074638 A1**

(43) **Pub. Date: Mar. 31, 2011**

(54) **ULTRA WIDE BAND SECONDARY ANTENNAS AND WIRELESS DEVICES USING THE SAME**

(52) **U.S. CL. .... 343/702; 343/749; 343/700 MS**

(76) **Inventors: Shaofang Gong, Norrkoping (SE); Owais Owais, Linkoping (SE); Zhinong Ying, Lund (SE)**

(57) **ABSTRACT**

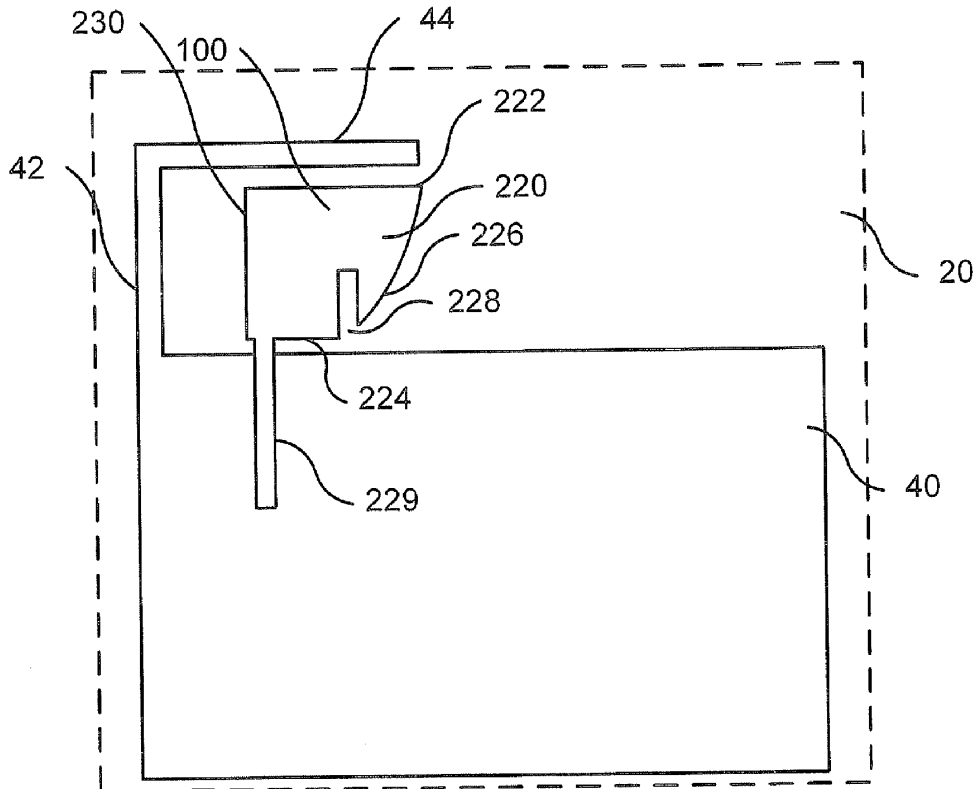
(21) **Appl. No.: 12/566,897**

A secondary antenna in a wireless communication terminal is provided. The secondary antenna includes an electrically conductive planar element that includes a first edge that is substantially linear and that includes a first length. The electrically conductive planar element may include a second edge that is substantially linear, that is opposite the first edge and that includes a second length that is less than the first length. At least one curved edge may be arranged between the first edge and the second edge. At least one elongated slot that is substantially perpendicular to the second edge may originate from a transition portion between the at least one curved edge and the second edge.

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

**Publication Classification**

(51) **Int. Cl.**  
**H01Q 1/38** (2006.01)  
**H01Q 9/00** (2006.01)  
**H01Q 1/24** (2006.01)





US 20110074639A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0074639 A1**

(43) **Pub. Date: Mar. 31, 2011**

(54) **DEVICE HOUSING**

(22) Filed: **Jun. 11, 2010**

(75) Inventors: **ZHI-GUO ZHAO**, Shenzhen City (CN); **YONG-FA FAN**, Shenzhen City (CN); **JIE ZENG**, Shenzhen City (CN); **YONG YAN**, Shenzhen City (CN); **ZHAN LI**, Santa Clara, CA (US)

(30) **Foreign Application Priority Data**

Sep. 25, 2009 (CN) ..... 200910307699.5

**Publication Classification**

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

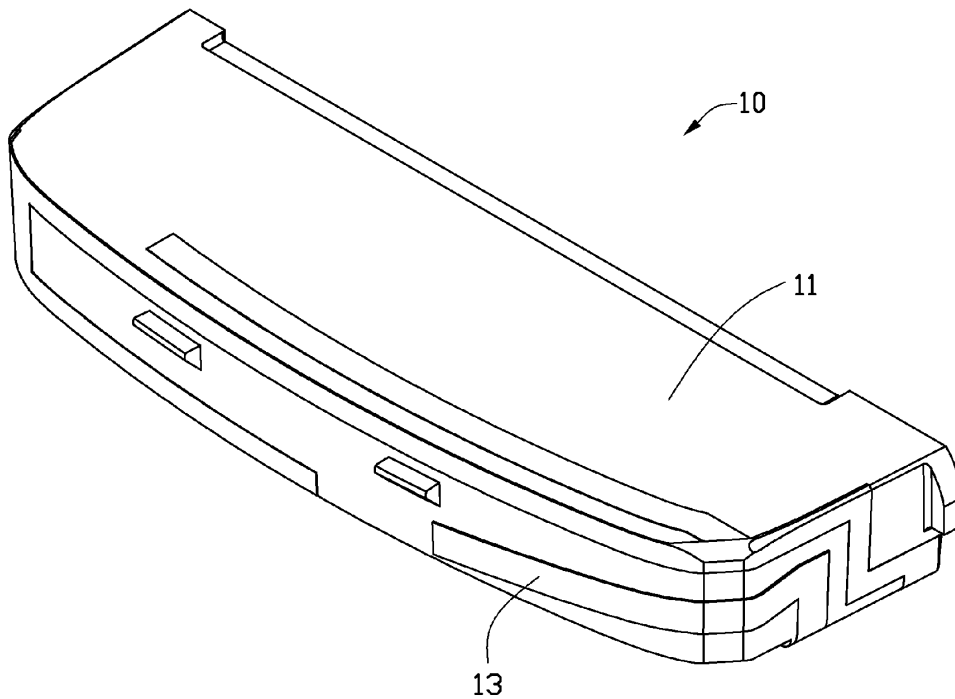
(52) **U.S. Cl.** ..... **343/702**

(57) **ABSTRACT**

A device housing comprises a main body and a three-dimensional antenna. The main body defines an antenna region thereon. The three-dimensional antenna is a conductive ink coating and is formed on the antenna region of the main body.

(73) Assignees: **SHENZHEN FUTAIHONG PRECISION INDUSTRY CO., LTD.**, ShenZhen City (CN); **FIH (HONG KONG) LIMITED**, Kowloon (HK)

(21) Appl. No.: **12/813,601**





US 20110074641A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0074641 A1**

(43) **Pub. Date: Mar. 31, 2011**

(54) **MULTIPLE RESONANCE ANTENNA AND COMMUNICATION DEVICE**

**Publication Classification**

(75) Inventors: **Naoki SOTOMA**, Tokyo (JP);  
**Noriyuki Hirabayashi**, Tokyo (JP)

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

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

(73) Assignee: **TDK CORPORATION**, Tokyo (JP)

(57) **ABSTRACT**

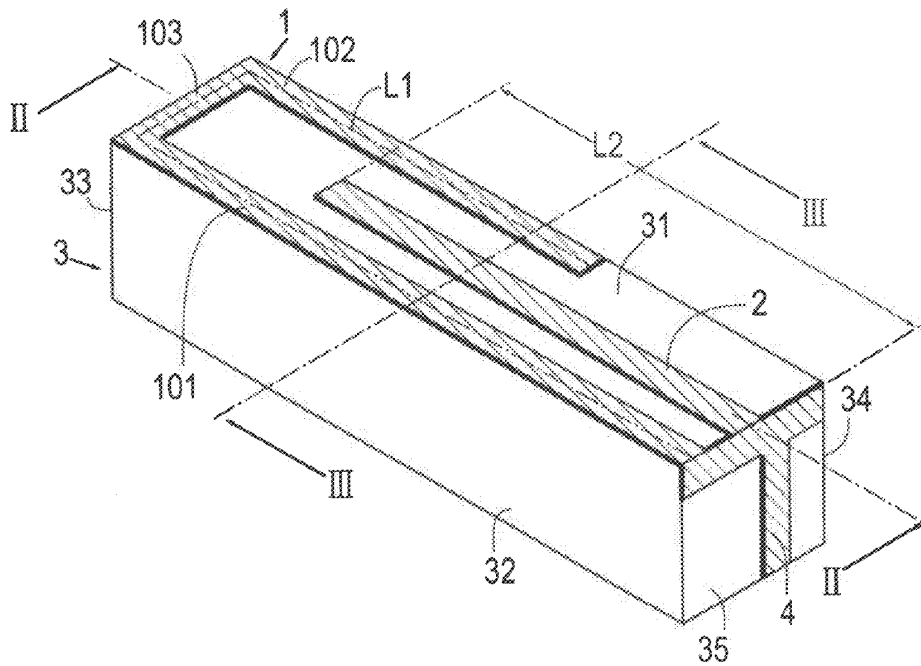
(21) Appl. No.: **12/880,831**

A multiple resonance antenna includes a dielectric substrate, a first antenna electrode and a second antenna electrode, wherein the first and second antenna electrodes are disposed alongside on the dielectric substrate with first ends connected in common but with second ends remaining free, the first antenna electrode is bent back to have a greater length between the first and second ends than the second antenna electrode, and the second antenna electrode is disposed between a forward part before the bend and a backward part after the bend of the first antenna electrode.

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

(30) **Foreign Application Priority Data**

Sep. 29, 2009 (JP) ..... 2009-225411





US 20110074647A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0074647 A1**

(43) **Pub. Date: Mar. 31, 2011**

(54) **ANTENNA MODULE**

**Publication Classification**

(75) Inventors: **YE XIONG**, Shenzhen (CN);  
**WEI-DONG HAO**, Shenzhen (CN)

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

(73) Assignees: **SHENZHEN FUTAIHONG  
PRECISION INDUSTRY CO.,  
LTD.**, ShenZhen City (CN); **FIH  
(HONG KONG) LIMITED**,  
Kowloon (HK)

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

(57) **ABSTRACT**

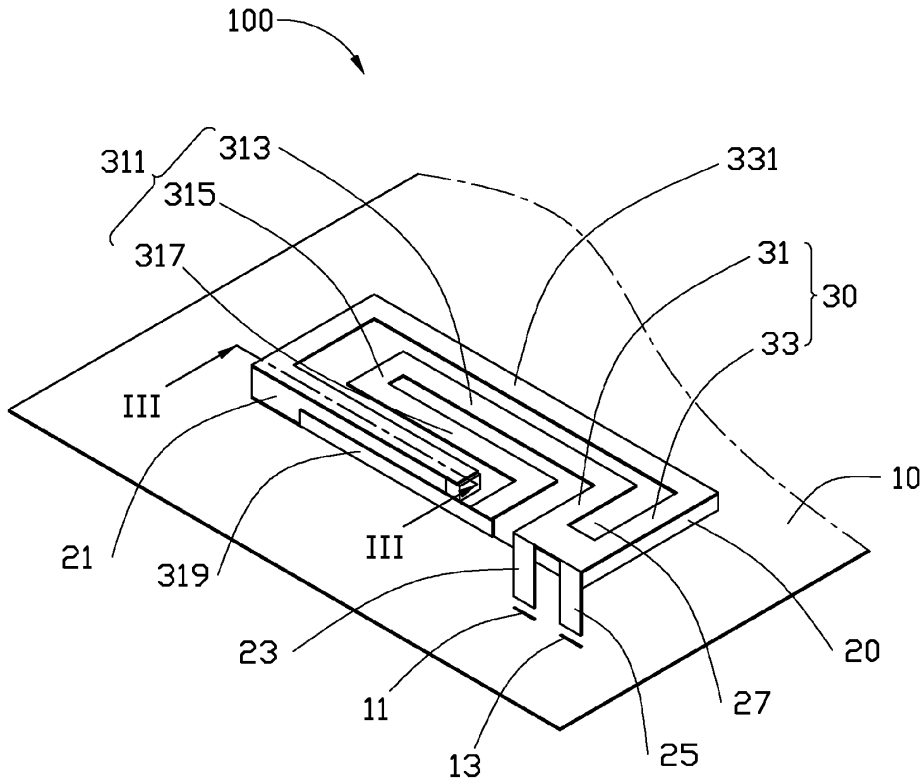
(21) Appl. No.: **12/753,227**

An antenna module includes a carrier and an antenna formed on the carrier. The carrier includes a first surface, a second surface, and a side surface. The antenna includes a first antenna portion and a second antenna portion. The first antenna portion includes a first radiation segment formed on the first surface and a second radiation segment formed on the side surface, the first radiation segment connects to the second radiation segment. The second antenna portion includes a third radiation segment formed on the first surface and a fourth radiation segment formed on the second surface, and the third radiation segment connects to the fourth radiation segment.

(22) Filed: **Apr. 2, 2010**

(30) **Foreign Application Priority Data**

Sep. 28, 2009 (CN) ..... 200910307839.9





US 20110074648A1

(19) **United States**

(12) **Patent Application Publication**  
**SHINKAWA**

(10) **Pub. No.: US 2011/0074648 A1**

(43) **Pub. Date: Mar. 31, 2011**

(54) **ANTENNA DEVICE**

**Publication Classification**

(75) Inventor: **Tomohiro SHINKAWA**, Akita-shi (JP)

(51) **Int. Cl.**  
**H01Q 1/48** (2006.01)  
**H01Q 7/00** (2006.01)  
**H01Q 1/50** (2006.01)

(73) Assignee: **MITSUMI ELECTRIC CO., LTD.**, Tama-shi (JP)

(52) **U.S. Cl.** ..... **343/848; 343/866; 343/859**

(21) Appl. No.: **12/891,988**

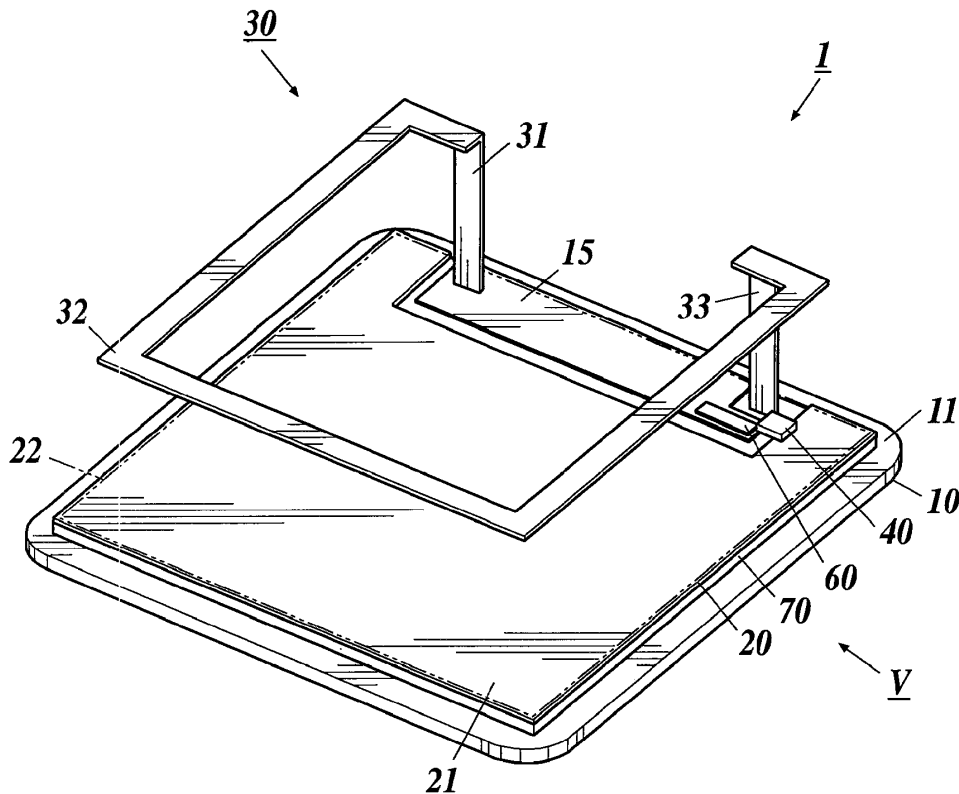
(57) **ABSTRACT**

(22) Filed: **Sep. 28, 2010**

An antenna device includes a ground section including a planar section, a feeding section, a first feeding element arranged along the planar section of the ground section, and a second feeding element including a loop-like body portion arranged parallel to the first feeding element at a predetermined distance from the first feeding element, the loop-like body portion including one end portion bent to be electrically connected to the ground section, and the other end portion bent to be electrically connected to the feeding section. Both of the one end portion and the other end portion of the second feeding element are provided in a vicinity of an outer periphery of the ground section.

(30) **Foreign Application Priority Data**

Sep. 30, 2009 (JP) ..... 2009-227325





US 20110074654A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0074654 A1**

(43) **Pub. Date: Mar. 31, 2011**

(54) **SHORTED MONOPOLE ANTENNA**

**Publication Classification**

(75) Inventors: SAOU-WEN SU, TAIPEI CITY (TW); JUI-HUNG CHOU, TAICHUNG CITY (TW)

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

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

(52) **U.S. Cl.** ..... 343/905; 343/700 MS

(57) **ABSTRACT**

(21) Appl. No.: 12/956,353

(22) Filed: Nov. 30, 2010

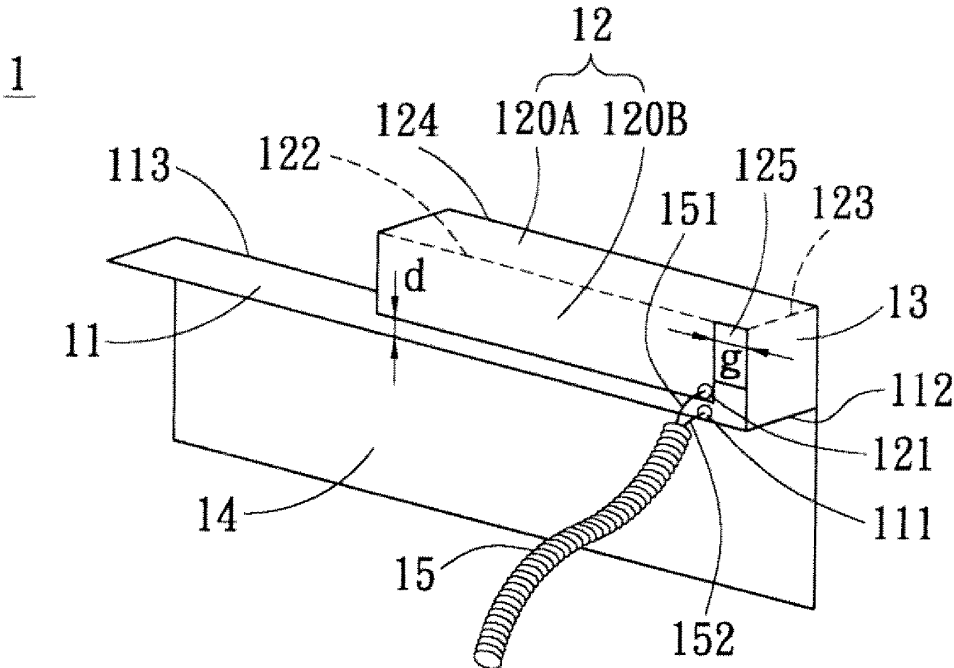
The present invention is related to a shorted monopole antenna. The antenna includes a ground portion, a radiating portion, a shorting portion, an assembling portion, and a coaxial cable. The ground portion includes a signal grounding point. The radiating portion is located above the ground portion and bent at least once, and includes a signal feeding point. One end of the shorting portion is connected to one of the short edges of the ground portion, and the other end is connected to one edge portion of the radiating portion. The assembling portion is connected to the long edge of the ground portion. The coaxial cable includes an inner conductor and an outer conductor, which are connected to the signal feeding point and the signal grounding point respectively. The antenna invented has good impedance bandwidth and radiation characteristics, can easily be installed inside the housing of an electronic device, and is well suitable for applications in wireless communications devices.

**Related U.S. Application Data**

(63) Continuation of application No. 12/230,302, filed on Aug. 27, 2008.

**Foreign Application Priority Data**

(30) Jul. 11, 2008 (CN) ..... 200810133548.8





US 20110075385A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0075385 A1**

(43) **Pub. Date: Mar. 31, 2011**

(54) **PORTABLE ELECTRONIC DEVICE**

(30) **Foreign Application Priority Data**

(75) Inventors: **YEN-JUNG TSENG**, Tu-Cheng (TW); **CHO-KANG HSU**, Tu-Cheng (TW)

Sep. 30, 2009 (CN) ..... 200910308055.8

**Publication Classification**

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

(51) **Int. Cl.**  
**H05K 5/00** (2006.01)

(52) **U.S. Cl.** ..... **361/752**

(57) **ABSTRACT**

(21) Appl. No.: **12/814,558**

A portable electronic device includes a housing, a circuit board received in the housing, and a memory card retaining mechanism received in the housing. The memory card retaining mechanism includes a plurality of conductive parts. The plurality of conductive parts cooperatively form an antenna integrated with the memory card retaining mechanism and connected to the circuit board.

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

