US 20110128185A1

(19) **United States**

(12) **Patent Application Publication**

Tsai et al.

(10) **Pub. No.: US 2011/0128185 A1**

(43) **Pub. Date: Jun. 2, 2011**

(54) **MULTI-BAND ANTENNA**

(76) Inventors: **Tiao-Hsing Tsai**, Yunghe City (TW); **Cheng-Hsiung Wu**, Kaohsiung City (TW); **Chao-Hsu Wu**, Lujhu Township (TW)

(21) Appl. No.: **12/789,647**

(22) Filed: **May 28, 2010**

(30) **Foreign Application Priority Data**

Nov. 27, 2009 (TW) 098140596

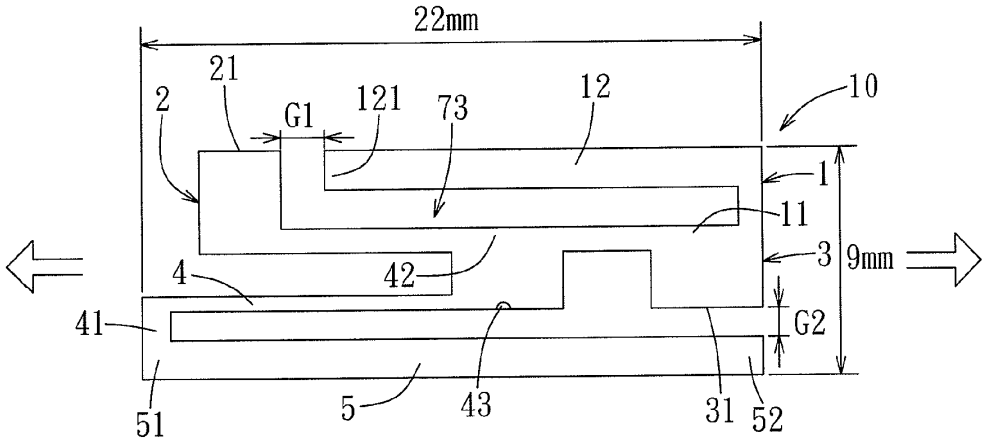
Publication Classification

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

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

(57) **ABSTRACT**

A multi-band antenna includes a ground section, a feed-in section, a first conductor arm, and a second conductor arm. The feed-in section has a first end, a second end opposite to the first end, and a feed-in point for feeding in radio frequency signals. The first end of the feed-in section is connected electrically to the ground section. The first conductor arm has a connecting section that extends from the second end of the feed-in section, and an extending section that extends from the connecting section, that is distal from the ground section, and that has a first end portion. The second conductor arm extends from the second end of the feed-in section, and has a second end portion that is adjacent to the first end portion of the extending section.



US 20110128186A1

(19) **United States**

(12) **Patent Application Publication**

Chung et al.

(10) **Pub. No.: US 2011/0128186 A1**

(43) **Pub. Date: Jun. 2, 2011**

(54) **PATCH ANTENNA**

(75) Inventors: **Tae Inn Chung**, Pohang (KR); **Byoung-Nam Kim**, Bucheon (KR); **Tae-Hwan Yoo**, Seoul (KR); **Young-Hun Park**, Cheongju (KR)

(73) Assignees: **HYUNDAI MOTOR COMPANY**, Seoul (KR); **KIA MOTORS CORPORATION**, Seoul (KR); **ACE TECHNOLOGIES CORPORATION**, Incheon (KR)

(21) Appl. No.: **12/823,340**

(22) Filed: **Jun. 25, 2010**

(30) **Foreign Application Priority Data**

Dec. 1, 2009 (KR) 10-2009-0117987

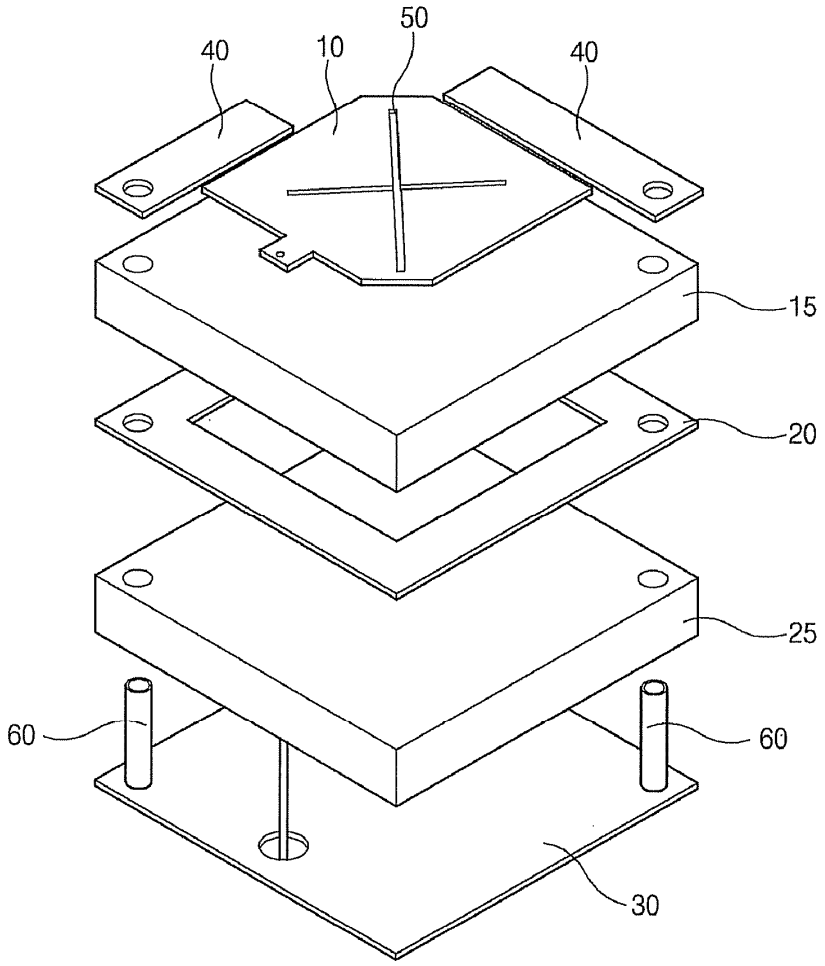
Publication Classification

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

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

(57) **ABSTRACT**

The present invention relates to a technology for forming a patch antenna generating both linearly and circularly polarized waves at the same time, so as to reduce a propagation loss during transmission/receiving operations between a circularly polarized antenna and a linearly polarized antenna.



US 20110128187A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0128187 A1

(43) Pub. Date: Jun. 2, 2011

JU et al.

(54) **SMALL ANTENNA USING SRR STRUCTURE IN WIRELESS COMMUNICATION SYSTEM AND METHOD FOR MANUFACTURING THE SAME**

(75) Inventors: **Jeongho JU**, Seoul (KR); **Jae-Ick CHOI**, Daejeon (KR); **Wangjoo LEE**, Daejeon (KR); **Dong-Ho KIM**, Daejeon (KR)

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

(21) Appl. No.: **12/913,985**

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

(30) **Foreign Application Priority Data**

Nov. 30, 2009 (KR) 10-2009-0117393

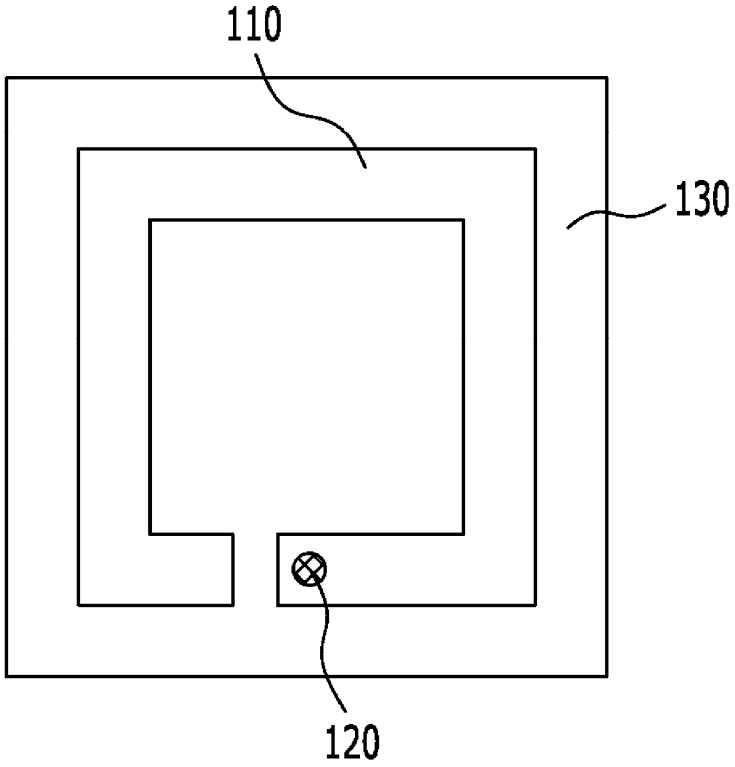
Publication Classification

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

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

(57) **ABSTRACT**

A small antenna using an SRR structure in a wireless communication system includes: a first radiation unit positioned over a dielectric substrate formed of a predetermined dielectric medium and having a predetermined ring shape; a feed unit positioned over the dielectric substrate and configured to feed a signal to the first radiation unit; a second radiation unit positioned under the dielectric substrate and having a predetermined ring shape; a via formed through the dielectric substrate to connect the first and second radiation units; a ground unit positioned under the dielectric substrate and configured to ground the first and second radiation units; and a metal line unit positioned under the dielectric substrate to connect the second radiation unit and the ground unit. The feed unit includes first and second capacitors which accomplish impedance matching when the signal is fed to the first radiation unit.



US 20110128188A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0128188 A1

(43) Pub. Date: Jun. 2, 2011

Sakai

(54) **ANTENNA**

(75) Inventor: **Hiroto Sakai**, Niiza-shi (JP)

(73) Assignee: **HONDA ACCESS CORP.**, Niiza-shi (JP)

(21) Appl. No.: **12/949,895**

(22) Filed: **Nov. 19, 2010**

(30) **Foreign Application Priority Data**

Nov. 30, 2009 (JP) 2009-272064

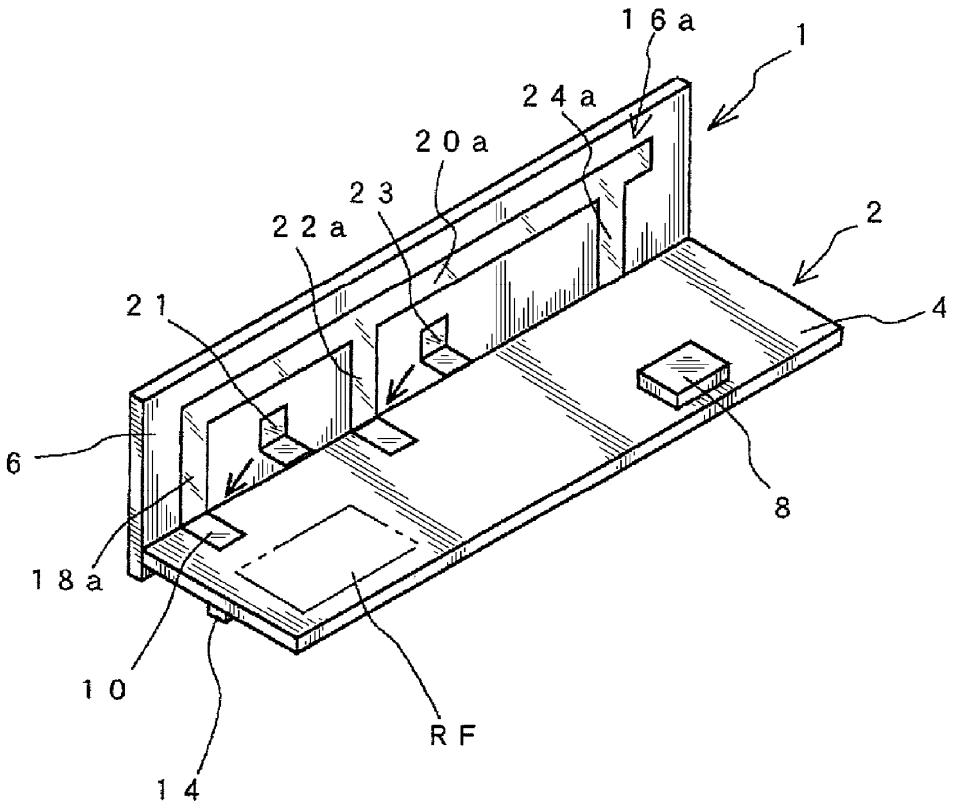
Publication Classification

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

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

(57) **ABSTRACT**

There is provided an antenna small in its size but capable of achieving sufficient gain. The antenna comprises antenna elements connected to a power source. The antenna elements comprise upstanding vertical sections connected to the power source and horizontal sections substantially parallel with a ground pattern and having one end thereof connected to an end portion of the vertical sections. The antenna elements further comprise short stubs provided away from the vertical sections toward the other end of the horizontal sections and connected to the ground pattern, and open-ended open stubs provided away from the short stubs toward the other end of the horizontal sections and extending from the horizontal sections toward the ground pattern. The antenna elements are made of a metal foil and are provided on an antenna board.



US 20110128190A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0128190 A1

(43) Pub. Date: Jun. 2, 2011

Galeev

(54) **WIRELESS COMMUNICATION TERMINAL WITH A SPLIT MULTI-BAND ANTENNA HAVING A SINGLE RF FEED NODE**

(75) Inventor: **Roustem Galeev**, Lund (SE)

(73) Assignee: **Sony Ericsson Mobile Communications AB**

(21) Appl. No.: **12/629,652**

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

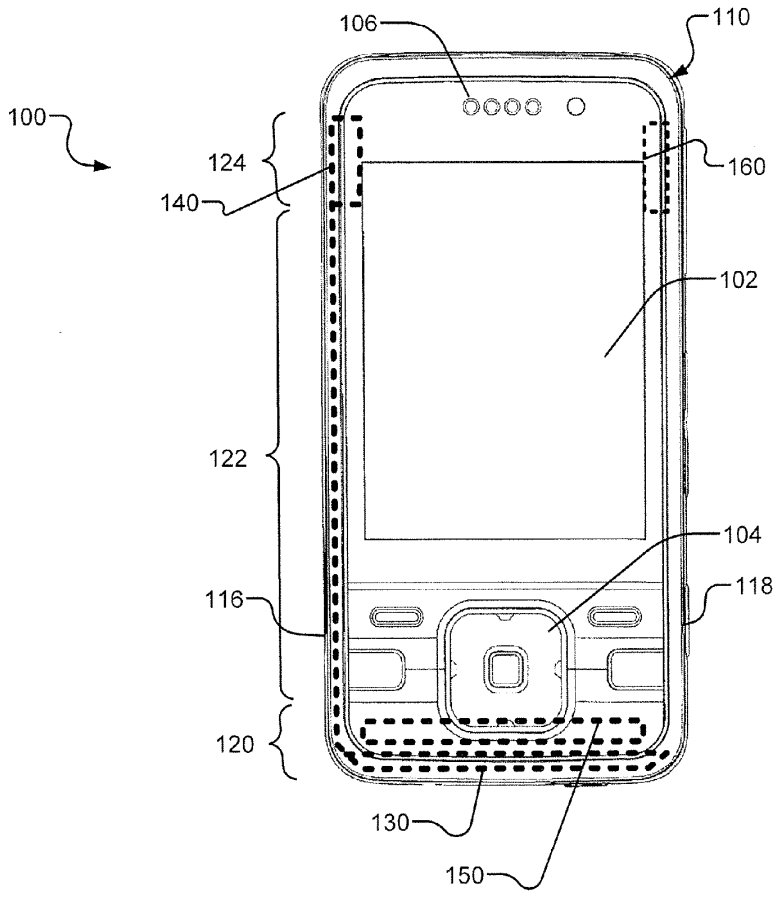
Publication Classification

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

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

(57) **ABSTRACT**

A wireless communications terminal can include a housing having an interior surface that is configured to enclose at least a transceiver circuit and a RF feed circuit. The housing extends between opposing top and bottom end surfaces and between opposing first and second side surfaces. A first radiator line primarily extends along one of the side surfaces and is connected to the RF feed node and to a first ground node. The first radiator line is configured to resonate in a first frequency range responsive to a first RF signal being provided to the RF feed node. A second radiator line is connected to the RF feed node through a stripline and/or coaxial cable and extends across at least a majority of a width of the housing between first and second side surfaces. The second radiator line is configured to resonate in a second frequency range, which is lower than the first frequency range, responsive to a second RF signal being provided to the RF feed node. The second radiator line can be grounded through the first ground node to resonate in the second frequency range.



US 20110128191A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0128191 A1

(43) Pub. Date: Jun. 2, 2011

Nishikido et al.

(54) **ANTENNA ELEMENT AND PORTABLE RADIO**

(75) Inventors: **Tomoaki Nishikido**, Sendai-shi (JP); **Hironori Kikuchi**, Sendai-shi (JP); **Yoshio Koyanagi**, Yokohama-shi (JP); **Kenichi Sato**, Sendai-shi (JP); **Hiroaki Ohmori**, Sendai-shi (JP)

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

(21) Appl. No.: **12/672,391**

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

(86) PCT No.: **PCT/JP2007/065751**

§ 371 (c)(1),
(2), (4) Date: **Feb. 5, 2010**

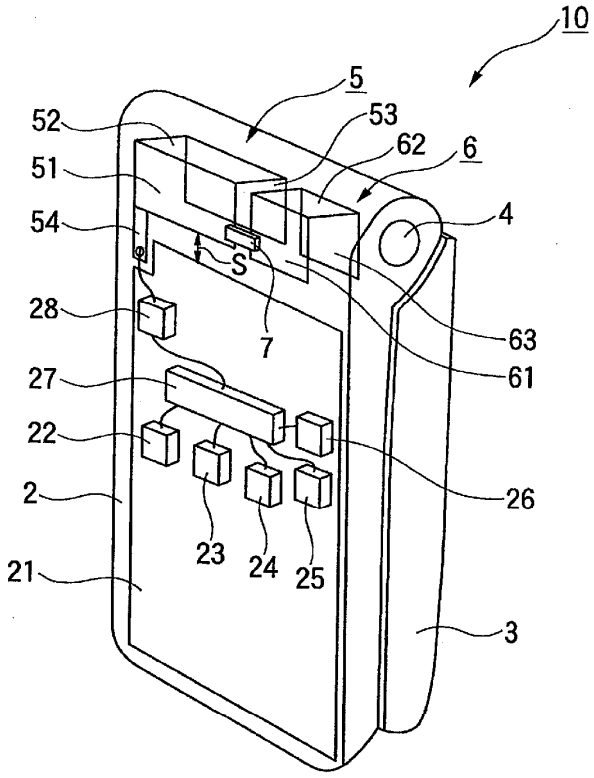
Publication Classification

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

(52) **U.S. Cl.** **343/702**; 343/843; 343/893

(57) **ABSTRACT**

There is provided an antenna element capable of implementing miniaturization, acquisition of a high gain, and broadening of a band and coping with multiple bands. The antenna element includes a first antenna element **5** having shape of a box (a rectangular-parallelepiped shape) in which a first conductor plate **51**, a second conductor plate **52**, and a third conductor plate **53** are arranged so as to define at least three surfaces of a substantial rectangular parallelepiped and in which electric power is fed from a substantial corner of a lower circuit board (a ground plate) **21** to the first conductor plate **51**; and a second antenna element **6** having shape of a box (a rectangular-parallelepiped shape) in which a fourth conductor plate **61**, a fifth conductor plate **62**, and a sixth conductor plate **63** are arranged so as to define at least three surfaces of a substantial rectangular parallelepiped, the fourth conductor plate **61** being connected by way of a resonance circuit **7** to the first antenna element **5** at a portion thereof apart from a feeding point of the first antenna element **5**.



US 20110128192A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0128192 A1

(43) Pub. Date: Jun. 2, 2011

LEE et al.

(54) ANTENNA DEVICE AND PORTABLE TERMINAL HAVING THE SAME

(76) Inventors: **Jaegon LEE**, Seoul (KR); **Ansun Hyun**, Seoul (KR); **Euntaek Jeoung**, Anyang (KR); **Yochuol Ho**, Seongnam (KR); **Viktor Kalinichev**, Moscow (RU)

(21) Appl. No.: **12/908,790**

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

(30) **Foreign Application Priority Data**

Dec. 2, 2009 (KR) 10-2009-0118688

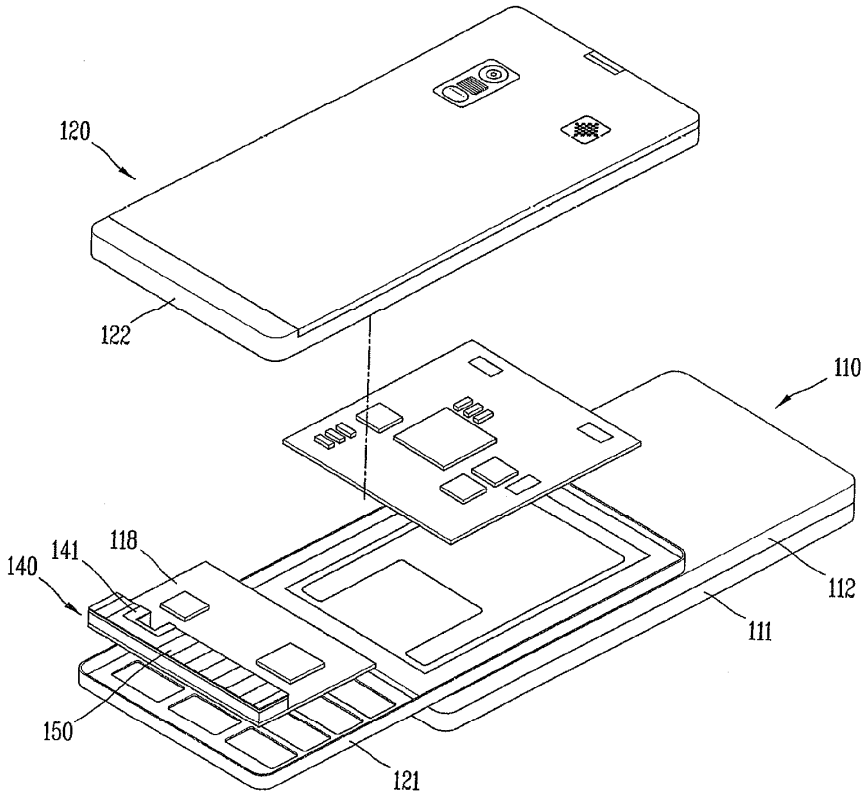
Publication Classification

(51) **Int. Cl.**
H01Q 19/10 (2006.01)
H01Q 1/24 (2006.01)

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

(57) **ABSTRACT**

Disclosed are an antenna device and a portable terminal having the same. The portable terminal includes a terminal body, a radiator including a conductive material, and configured in a preset pattern to transmit or receive wireless signals, a circuit board mounted to the terminal body, and configured to process the wireless signal by being electrically connected to the radiator, and an artificial magnetic conductor module disposed near the radiator, and configured to reflect the wireless signal.



US 20110128195A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0128195 A1

(43) Pub. Date: Jun. 2, 2011

Ryou et al.

(54) **EMBEDDED ANTENNA OF WIRELESS DEVICE AND METHOD OF MANUFACTURING THEREOF**

(76) Inventors: **Byung Hoon Ryou**, Seoul (KR); **Won Mo Sung**, Siheung-si (KR); **Kang Hee Lee**, Gimpo-si (KR)

(21) Appl. No.: **13/057,720**

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

(86) PCT No.: **PCT/KR09/04364**

§ 371 (c)(1),
(2), (4) Date: **Feb. 4, 2011**

(30) **Foreign Application Priority Data**

Aug. 6, 2008 (KR) 10-2008-0077068

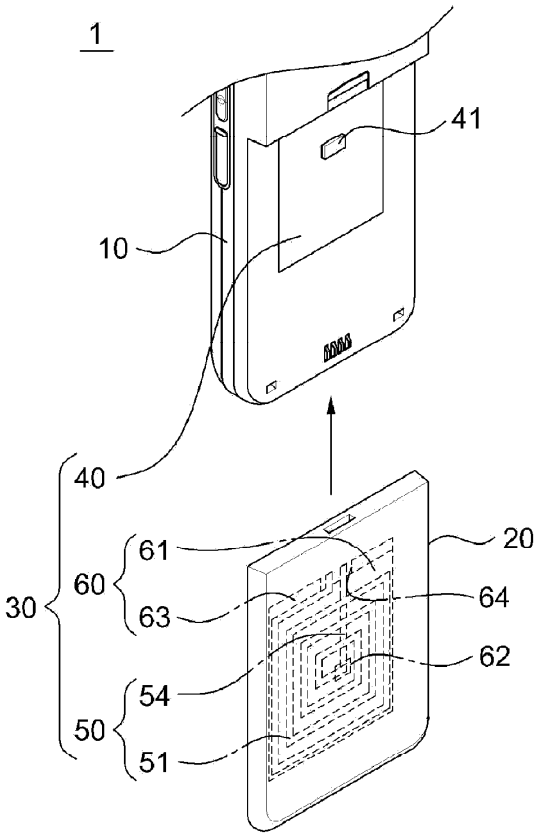
Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 1/40 (2006.01)
H01P 11/00 (2006.01)

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

(57) **ABSTRACT**

Disclosed is an embedded antenna of a wireless device that can be formed by pattern printing and a manufacturing method thereof. The embedded antenna of a wireless device according to the present invention comprises a substrate accommodated in the wireless device; a radiation unit printed on an inner surface of a housing of the wireless device and connected to the substrate, for transmitting and receiving electrical signals; and an insulation unit printed on the radiation unit, for insulating the radiation unit. Here, the radiation unit includes first and second radiators sequentially printed as a pattern on the inner surface of the housing, and the insulation unit includes first and second insulators printed to cover the first and second radiators in order. According to the configuration like this, since the radiation unit and the insulation unit can be formed to have a minimum thickness by pattern printing, the size of the embedded antenna embedded in the wireless device can be minimized.



US 20110128199A1

(19) **United States**

(12) **Patent Application Publication**

He et al.

(10) **Pub. No.: US 2011/0128199 A1**

(43) **Pub. Date: Jun. 2, 2011**

(54) **FIELD-CONFINED WIDEBAND ANTENNA FOR RADIO FREQUENCY FRONT END INTEGRATED CIRCUITS**

(76) Inventors: **Ziming He**, Irvine, CA (US); **Ping Peng**, Irvine, CA (US); **Oleksandr Gorbachov**, Irvine, CA (US)

(21) Appl. No.: **12/914,922**

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

Related U.S. Application Data

(60) Provisional application No. 61/256,172, filed on Oct. 29, 2009.

Publication Classification

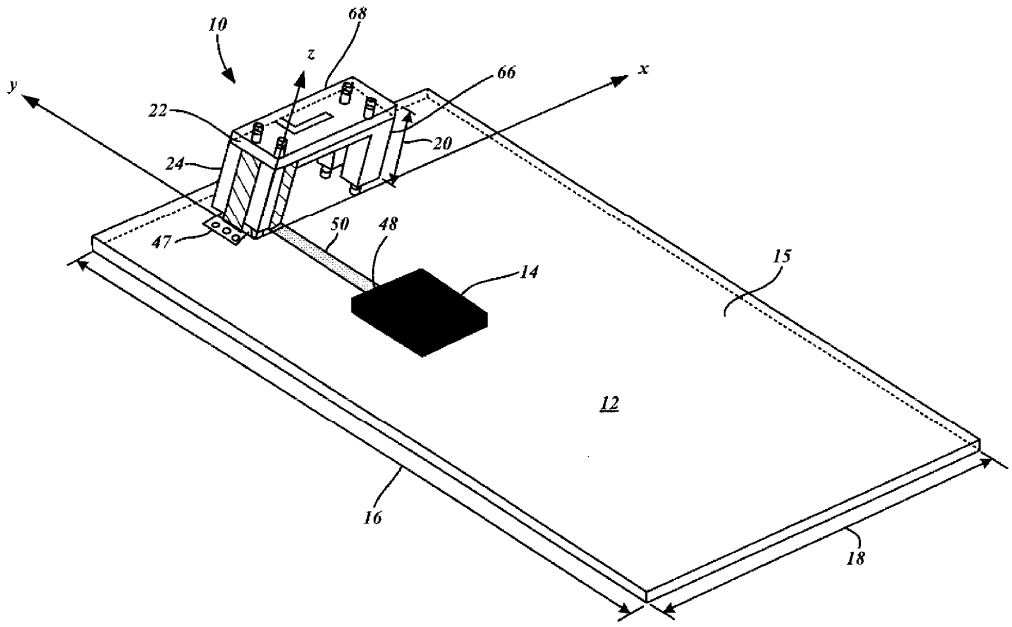
(51) **Int. Cl.**

H01Q 13/10	(2006.01)
H01Q 7/00	(2006.01)
H01Q 1/42	(2006.01)

(52) **U.S. Cl.** **343/742**; 343/741

(57) **ABSTRACT**

A field-confined wideband antenna assembly is disclosed. The antenna assembly includes a radiating element with a planar body that defines a first confining slot. The dimensions of the first confining slot correspond to a first set of resonance frequencies of the radiating element. A feeding line extends from the radiating element in an angularly offset relationship to the planar body. A first grounding line extends from the radiating element in an angularly offset relationship to the first body. A dielectric assembly supports the planar body of the radiating element. There is a first high frequency current loop that is formed from the feeding line to the radiating element about the first confining slot and to the first grounding line. With this, the first high frequency current loop confines current and electric fields on the radiating element.



US 20110128200A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0128200 A1

(43) Pub. Date: Jun. 2, 2011

Hossain et al.

(54) ANTENNA AND RADIO COMMUNICATION APPARATUS

(75) Inventors: **Md. Golam. Sorwar Hossain**, Kawasaki (JP); **Takashi Yamagajo**, Kawasaki (JP)

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

(21) Appl. No.: **12/889,689**

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

(30) **Foreign Application Priority Data**

Nov. 27, 2009 (JP) 2009-269934

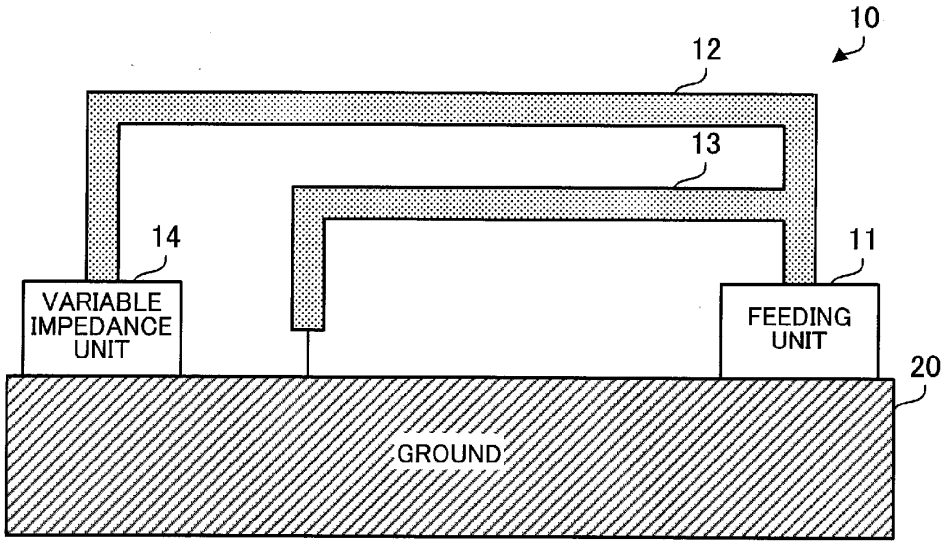
Publication Classification

(51) **Int. Cl.**
H01Q 9/16 (2006.01)
H01Q 9/36 (2006.01)

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

(57) **ABSTRACT**

An antenna includes a first arm whose one end is connected to a feeding unit, a second arm whose one end is connected to the first arm at a position that is away from the one end of the first arm and whose other end is connected to ground, and a variable impedance unit whose impedance is variable, provided between the ground and the other end of the first arm.



US 20110128201A1

(19) **United States**

(12) **Patent Application Publication**

JU et al.

(10) **Pub. No.: US 2011/0128201 A1**

(43) **Pub. Date: Jun. 2, 2011**

(54) **CIRCULARLY POLARIZED ANTENNA IN WIRELESS COMMUNICATION SYSTEM AND METHOD FOR MANUFACTURING THE SAME**

(75) Inventors: **Jeong-Ho JU**, Seoul (KR); **Jae-Ick Choi**, Daejeon (KR); **Wangjoo Lee**, Daejeon (KR); **Dong-Ho Kim**, Daejeon (KR)

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

(21) Appl. No.: **12/953,124**

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

(30) **Foreign Application Priority Data**

Nov. 30, 2009 (KR) 10-2009-0117392
Nov. 30, 2009 (KR) 10-2009-0117456

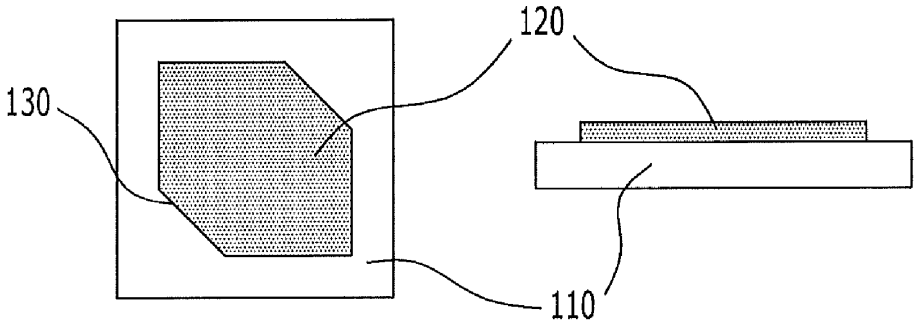
Publication Classification

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

(52) **U.S. Cl.** **343/756**; 29/600

(57) **ABSTRACT**

A circularly polarized antenna in a wireless communication system includes: at least one feed antenna positioned at a predetermined point on at least one ground substrate; and a unit antenna having a plurality of conductive structures arranged in a predetermined identical direction on a superstrate positioned at a predetermined distance from above the feed antenna. The plurality of conductive structures and the unit antenna are configured to radiate circularly polarized waves, respectively, when the feed antenna radiates linearly polarized waves.



US 20110128206A1

(19) **United States**

(12) **Patent Application Publication**

WAKABAYASHI

(10) **Pub. No.: US 2011/0128206 A1**

(43) **Pub. Date: Jun. 2, 2011**

(54) **MULTI-ANTENNA APPARATUS AND MOBILE DEVICE**

(75) Inventor: **Naoyuki WAKABAYASHI**, Daito-shi (JP)

(73) Assignee: **Funai Electric Co., Ltd.**, Daito-shi (JP)

(21) Appl. No.: **12/956,750**

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

(30) **Foreign Application Priority Data**

Nov. 30, 2009 (JP) 2009-270941

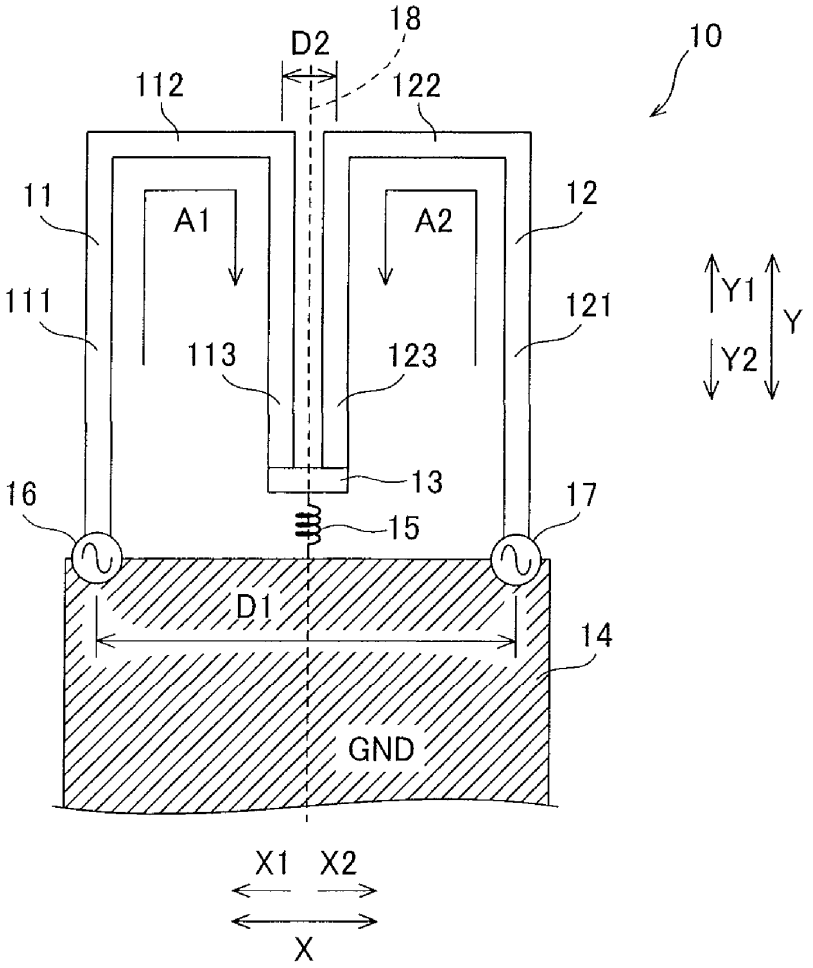
Publication Classification

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

(52) **U.S. Cl.** **343/860**; 343/867

(57) **ABSTRACT**

This multi-antenna apparatus includes a first looped antenna element wound from a first end of the first looped antenna element on a side of a first feeding point in a prescribed direction, a second looped antenna element wound from a first end of the second looped antenna element on a side of a second feeding point in a direction opposite to the prescribed direction, a connecting portion connecting a second end of the first looped antenna element and a second end of the second looped antenna element with each other, and an impedance element arranged between the connecting portion and a ground potential.



US 20110128222A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0128222 A1

(43) Pub. Date: Jun. 2, 2011

HIROTA et al.

(54) **INFORMATION PROCESSING APPARATUS AND CONTROL METHOD**

(75) Inventors: **Toshiyuki HIROTA**, Hino-shi (JP); **Koichi KAJI**, Hidaka-shi (JP); **Masao TESHIMA**, Kunitachi-shi (JP)

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

(21) Appl. No.: **12/904,962**

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

(30) **Foreign Application Priority Data**

Nov. 30, 2009 (JP) 2009-272694

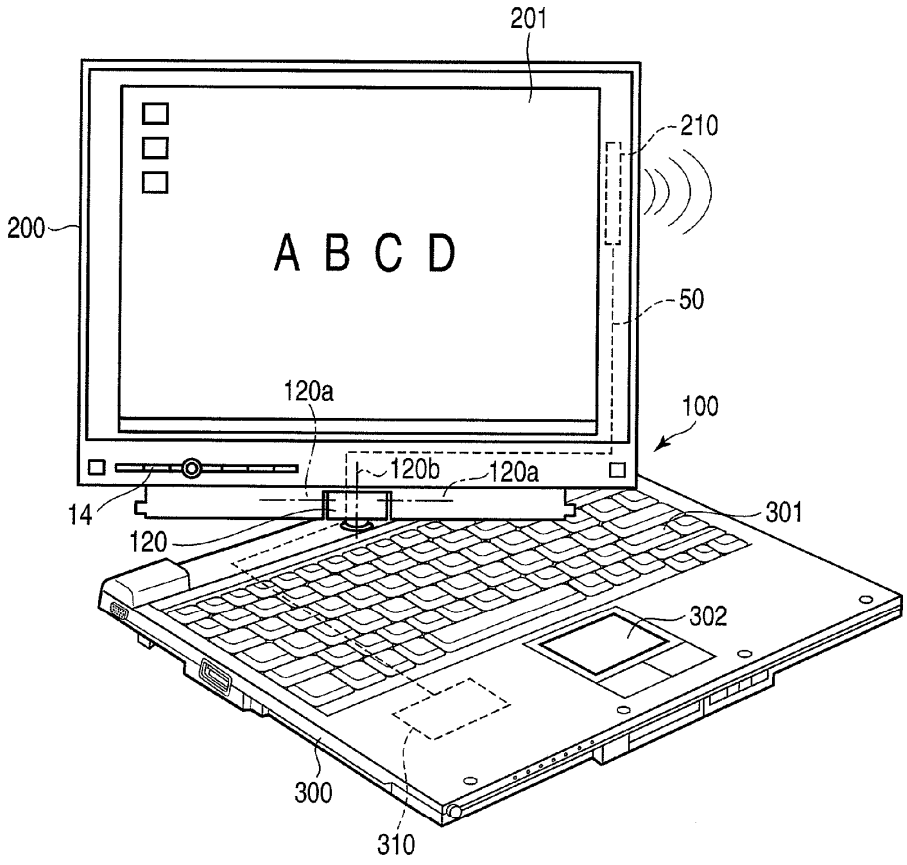
Publication Classification

(51) **Int. Cl.**
G06F 3/033 (2006.01)

(52) **U.S. Cl.** **345/158**

(57) **ABSTRACT**

According to one embodiment, a switch circuit switches a resonance frequency band of an antenna in a display unit between first and second resonance frequency bands. The second resonance frequency band is overlapped with a part of the first resonance frequency band and is higher than the first resonance frequency band. A wireless communication module wirelessly transmits and receives signals using a transmission frequency band and a reception frequency band which are included in the first resonance frequency band. A screen image orientation control module changes an orientation of a screen image displayed on the display unit. A resonance frequency shift module shifts the resonance frequency band of the antenna from the first resonance frequency band to the second frequency band by controlling the switch circuit when the orientation of the screen image is an orientation in which the antenna is positioned on a downward side of the screen image.



US 20110133992A1

(19) **United States**

(12) **Patent Application Publication**

SUZUKI

(10) **Pub. No.: US 2011/0133992 A1**

(43) **Pub. Date: Jun. 9, 2011**

(54) **ANTENNA APPARATUS**

(75) Inventor: **Tomotaka SUZUKI**, Miyagi-Ken (JP)

(73) Assignee: **ALPS ELECTRIC CO., LTD**, Tokyo (JP)

(21) Appl. No.: **12/961,106**

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

(30) **Foreign Application Priority Data**

Dec. 7, 2009 (JP) 2009-277773

Publication Classification

(51) **Int. Cl.**

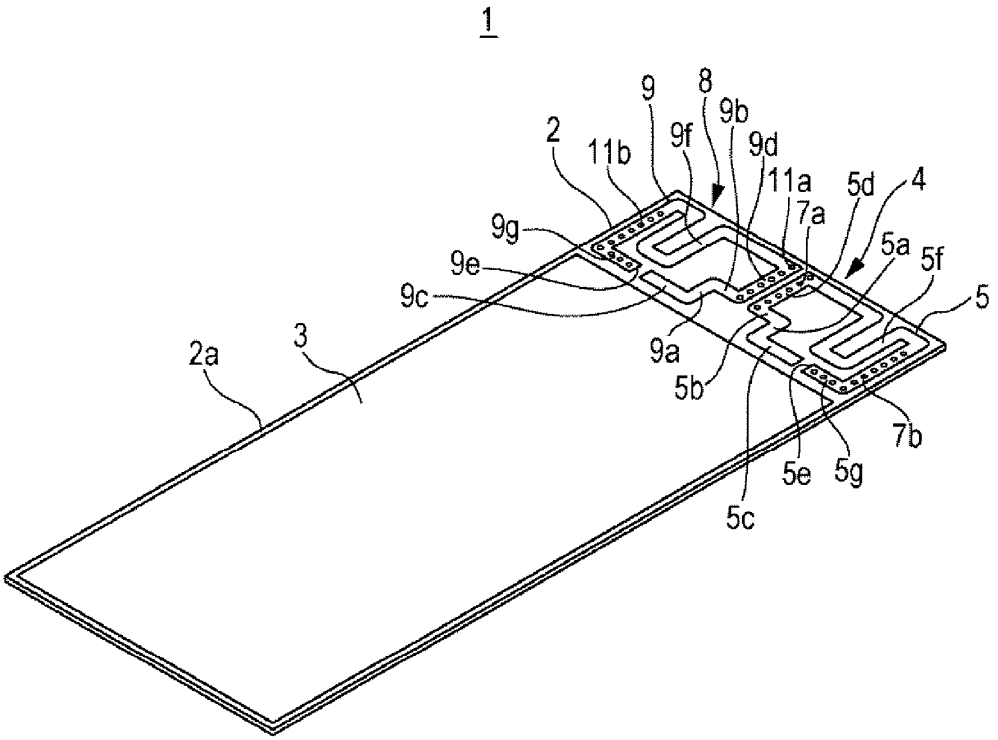
H01Q 1/38 (2006.01)

H01Q 9/04 (2006.01)

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

(57) **ABSTRACT**

In an antenna apparatus, two pattern antennas are arranged side by side in an area close to a ground conductor layer on a surface of a dielectric substrate, in such a manner as to be formed substantially line-symmetrical with each other. Each of the pattern antennas includes a radiation element having a feed coupler, a mutual coupler, and a feed element fed by a high frequency circuit unit. An open end of the radiation element is located near the ground conductor layer. The feed element and the feed coupler are capacitively coupled with each other, whereby the radiation element is excited. At the excitation, the mutual couplers that extend substantially in parallel with and close to each other are capacitively coupled with each other, and hence, polarization planes of the electric fields radiated from the radiation elements can be made orthogonal to each other.



US 20110133993A1

(19) **United States**

(12) **Patent Application Publication**

UTAGAWA et al.

(10) **Pub. No.: US 2011/0133993 A1**

(43) **Pub. Date: Jun. 9, 2011**

(54) **ANTENNA DEVICE**

(75) Inventors: **Naoaki UTAGAWA**, Tokyo (JP); **Kei Suzuki**, Tokyo (JP); **Yasumasa Harihara**, Tokyo (JP); **Masaki Matsushima**, Tokyo (JP); **Takeshi Ohashi**, Tokyo (JP)

(73) Assignee: **TDK CORPORATION**

(21) Appl. No.: **12/963,083**

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

(30) **Foreign Application Priority Data**

Dec. 9, 2009 (JP) 2009-279272

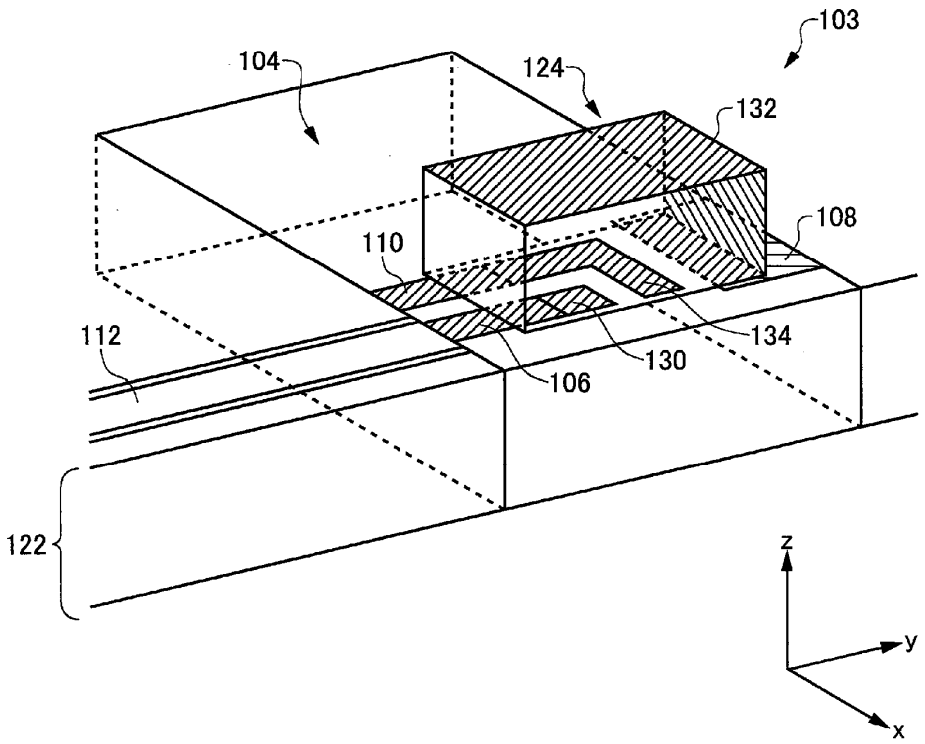
Publication Classification

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

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

(57) **ABSTRACT**

A radiation electrode **132** is printed on the upper surface of the dielectric body, side surface thereof, and bottom surface thereof in a folded configuration. A feeding electrode **130** and ground electrode **134** are printed on the bottom surface of the antenna elements **124**. The feeding electrode **130** and radiation electrode **132** on the upper surface are opposed to each other as parallel planes. The ground electrode **134** and radiation electrode **132** are also opposite to each other as parallel planes. No electrode is formed on one of the side surfaces of the antenna element **124** that is opposed to the side surface at the side of which the radiation electrode **132** is folded.



100

US 20110133994A1

(19) **United States**

(12) **Patent Application Publication**

Korva

(10) **Pub. No.: US 2011/0133994 A1**

(43) **Pub. Date: Jun. 9, 2011**

(54) **INTERNAL MULTI-BAND ANTENNA AND METHODS**

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

(21) Appl. No.: **12/672,665**

(22) PCT Filed: **Nov. 8, 2007**

(86) PCT No.: **PCT/FI2007/050600**

§ 371 (c)(1),
(2), (4) Date: **Feb. 17, 2011**

(30) **Foreign Application Priority Data**

Nov. 15, 2006 (FI) 20065728

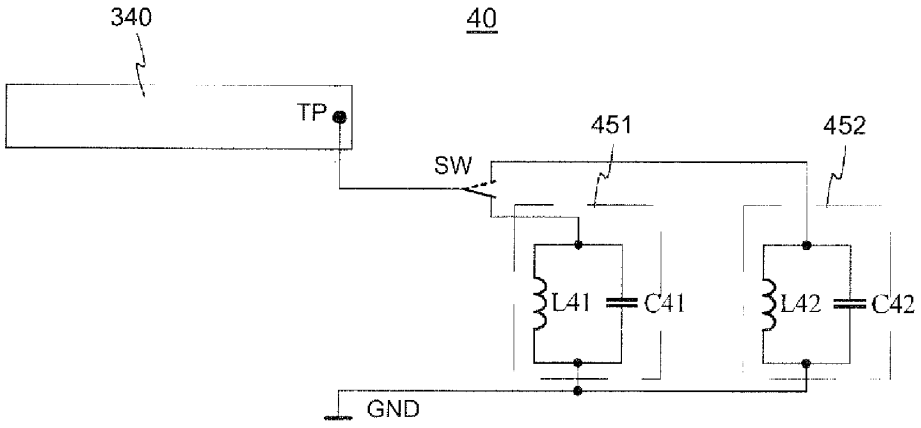
Publication Classification

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

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

(57) **ABSTRACT**

An internal multi-band antenna and a radio device comprising such an antenna. A radiator (**320**) of the antenna is a conductivepart of the outer cover (COV) of a radio device or conductive coating of the cover. The radiator is electromagnetically fed by a feed element (**330**) which is isolated from the radiator by a relatively thin dielectric layer. The feed element is shaped so that it has, together with the other parts of the antenna, resonance frequencies in the range of at least two desired operating bands. The antenna structure further includes a parasitic tuning element (**340**) and a switch (SW) by which the tuning element can be coupled to the signal ground (GND) through at least two alternative reactive circuits. The tuning element is dimensioned and placed and the component values of the reactive circuits are chosen so that of two operating bands of the antenna the locations of both are displaced in a desired way when changing the state of the switch. By means of a relatively simple switch arrangement, the antenna can be made to cover the frequency ranges of four systems, and it can also be optimised for each system separately, because its operating bands only cover the range used by one system at a time.



US 20110133995A1

(19) **United States**

(12) **Patent Application Publication**

Pascolini et al.

(10) **Pub. No.: US 2011/0133995 A1**

(43) **Pub. Date: Jun. 9, 2011**

(54) **BEZEL GAP ANTENNAS**

(76) Inventors: **Mattia Pascolini**, Campbell, CA (US); **Robert J. Hill**, Salinas, CA (US); **Juan Zavala**, Watsonville, CA (US); **Nanbo Jin**, Sunnyvale, CA (US); **Qingxiang Li**, Mountain View, CA (US); **Robert W. Schlub**, Cupertino, CA (US); **Ruben Caballero**, San Jose, CA (US)

(21) Appl. No.: **12/871,866**

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

Related U.S. Application Data

(63) Continuation-in-part of application No. 12/630,756, filed on Dec. 3, 2009.

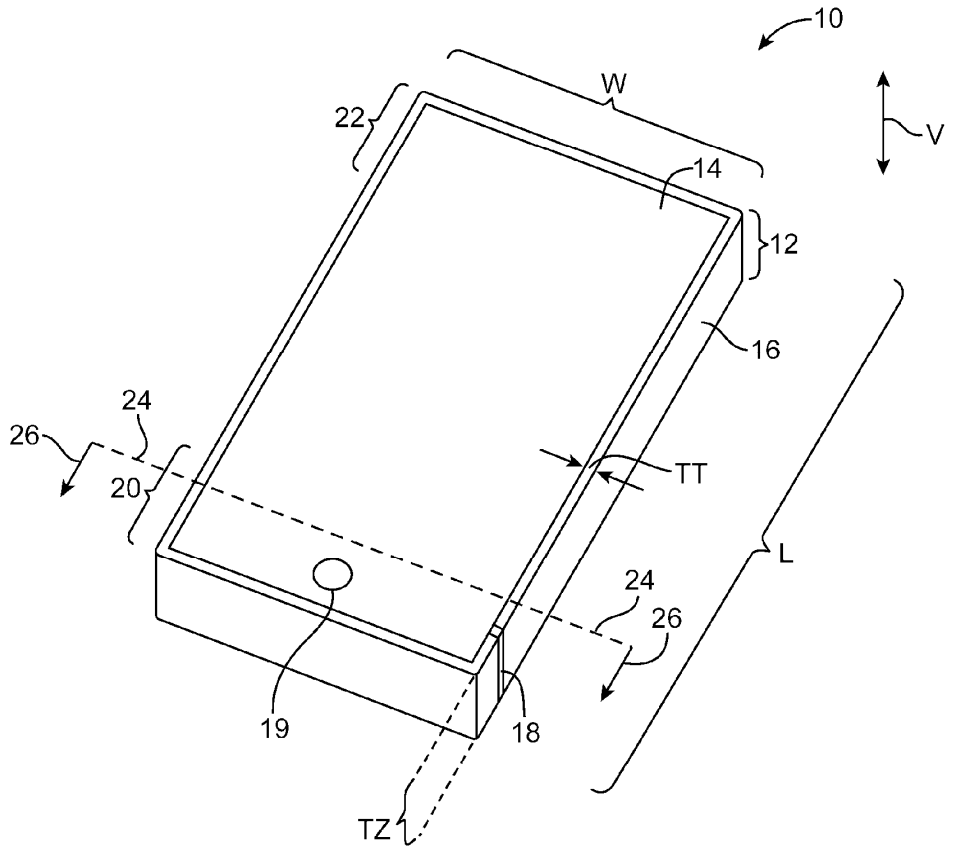
Publication Classification

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

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

(57) **ABSTRACT**

Electronic devices are provided that contain wireless communications circuitry. The wireless communications circuitry may include radio-frequency transceiver circuitry and antenna structures. A parallel-fed loop antenna may be formed from portions of an electronic device bezel and a ground plane. The antenna may operate in multiple communications bands. An impedance matching circuit for the antenna may be formed from a parallel-connected inductive element and a series-connected capacitive element. The bezel may surround a peripheral portion of a display that is mounted to the front of an electronic device. The bezel may contain a gap. Antenna feed terminals for the antenna may be located on opposing sides of the gap. The inductive element may bridge the gap and the antenna feed terminals. The capacitive element may be connected in series between one of the antenna feed terminals and a conductor in a transmission line located between the transceiver circuitry and the antenna.



US 20110133997A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0133997 A1

(43) Pub. Date: Jun. 9, 2011

LEE

(54) **BUILT-IN ANTENNA APPARATUS SERVED AS STYLUS PEN IN PORTABLE TERMINAL**

(75) Inventor: **Seung-Hak LEE**, Hwaseong-si (KR)

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

(21) Appl. No.: **12/961,853**

(22) Filed: **Dec. 7, 2010**

(30) **Foreign Application Priority Data**

Dec. 9, 2009 (KR) 10-2009-0121559

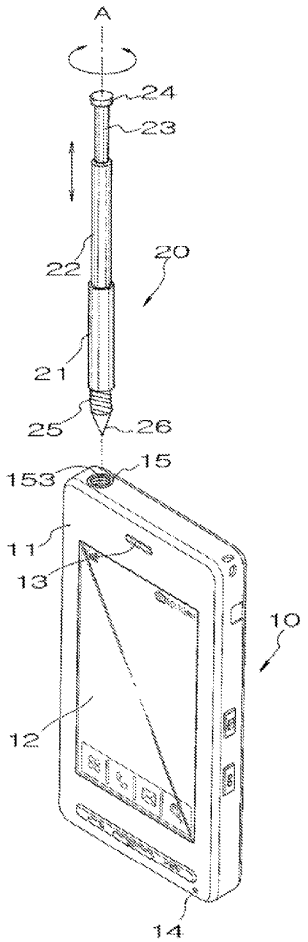
Publication Classification

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

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

(57) **ABSTRACT**

A built-in antenna apparatus for digital broadcasting reception in a portable terminal is provided. The apparatus includes a digital broadcasting reception module installed in a main board of the portable terminal, a fixing piece slidably installed in a guide slit having a specific length and disposed on a side of the broadcasting reception module, an electrical connection element for electrically connecting the fixing piece and the digital broadcasting reception module, and a built-in antenna detachably connected to an end of the fixing piece, insertable inside the portable terminal together with the fixing piece, having a specific length, and is electrically connected to the digital broadcasting reception module, wherein the built-in antenna is useable as a stylus pen when detached from the fixing piece.



US 20110133998A1

(19) **United States**

(12) **Patent Application Publication**

Hobson et al.

(10) **Pub. No.: US 2011/0133998 A1**

(43) **Pub. Date: Jun. 9, 2011**

(54) **HANDHELD ELECTRONIC DEVICE WITH CABLE GROUNDING**

(76) Inventors: **Philip M. Hobson**, Menlo Park, CA (US); **Erik L. Wang**, Redwood City, CA (US); **Kenneth A. Jenks**, Cupertino, CA (US); **Robert J. Hill**, Salinas, CA (US); **Robert W. Schlub**, Campbell, CA (US); **Richard Hung Minh Dinh**, San Jose, CA (US); **Tang Yew Tan**, San Francisco, CA (US); **Adam D. Mittleman**, San Francisco, CA (US)

(21) Appl. No.: **13/021,689**

(22) Filed: **Feb. 4, 2011**

Related U.S. Application Data

(63) Continuation of application No. 11/821,329, filed on Jun. 21, 2007, now Pat. No. 7,889,139.

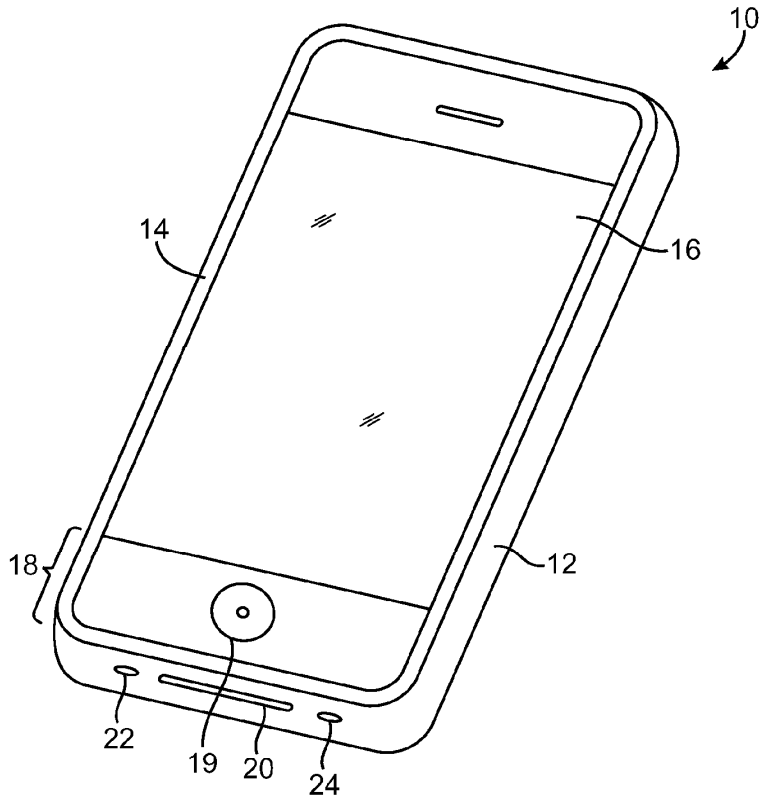
Publication Classification

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

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

(57) **ABSTRACT**

A handheld electronic device may be provided that contains a conductive housing and other conductive elements. The conductive elements may form an antenna ground plane. One or more antennas for the handheld electronic device may be formed from the ground plane and one or more associated antenna resonating elements. Transceiver circuitry may be connected to the resonating elements by transmission lines such as coaxial cables. Ferrules may be crimped to the coaxial cables. A bracket with extending members may be crimped over the ferrules to ground the coaxial cables to the housing and other conductive elements in the ground plane. The ground plane may contain an antenna slot. A dock connector and flex circuit may overlap the slot in a way that does not affect the resonant frequency of the slot. Electrical components may be isolated from the antenna using isolation elements such as inductors and resistors.



US 20110134002A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0134002 A1

(43) Pub. Date: Jun. 9, 2011

Suto et al.

(54) **CAPACITY LOADED PLANAR ANTENNA WITH SHORT STUBS**

(76) Inventors: **Masaki Suto**, Tokyo (JP); **Ryoji Matsubara**, Yokohama (JP); **Naobumi Michishita**, Tsukuba (JP)

(21) Appl. No.: **12/926,532**

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

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2009/002310, filed on May 26, 2009.

(30) **Foreign Application Priority Data**

May 28, 2008 (JP) 2008-139617

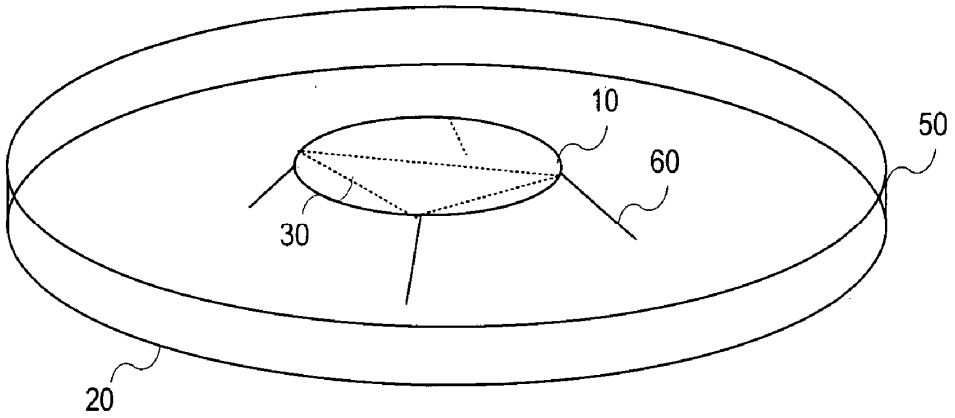
Publication Classification

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

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

(57) **ABSTRACT**

Provided is a capacity loaded planar antenna with short stubs that can be brought to a small size and a low profile, achieves wider bandwidth, and can be tuned to multiple frequencies. A capacity loaded planar antenna with short stubs that has a simple structure and can be easily manufactured includes a base plate, an antenna element disposed so as to be parallel to the base plate, a plurality of short stubs that connect the antenna element to the base plate, and a side wall formed on the end of the base plate. The capacity loaded planar antenna achieves wider bandwidth with the small size and low profiled, can be tuned to multiple frequencies by adjusting the length of the short stubs, and uses plate-shaped foldable short stubs that are integrated with the antenna element.



US 20110134003A1

(19) **United States**

(12) **Patent Application Publication**

Okada

(10) **Pub. No.: US 2011/0134003 A1**

(43) **Pub. Date: Jun. 9, 2011**

(54) **ANTENNA DEVICE**

(75) Inventor: **Hiroki Okada**, Aichi-ken (JP)

(73) Assignee: **TOYOTA JIDOSHA KABUSHIKI KAISHA**, Toyota-shi, Aichi-ken (JP)

(21) Appl. No.: **13/000,968**

(22) PCT Filed: **Apr. 30, 2009**

(86) PCT No.: **PCT/IB2009/005430**

§ 371 (c)(1),
(2), (4) Date: **Dec. 22, 2010**

(30) **Foreign Application Priority Data**

Jun. 27, 2008 (JP) 2008-168642

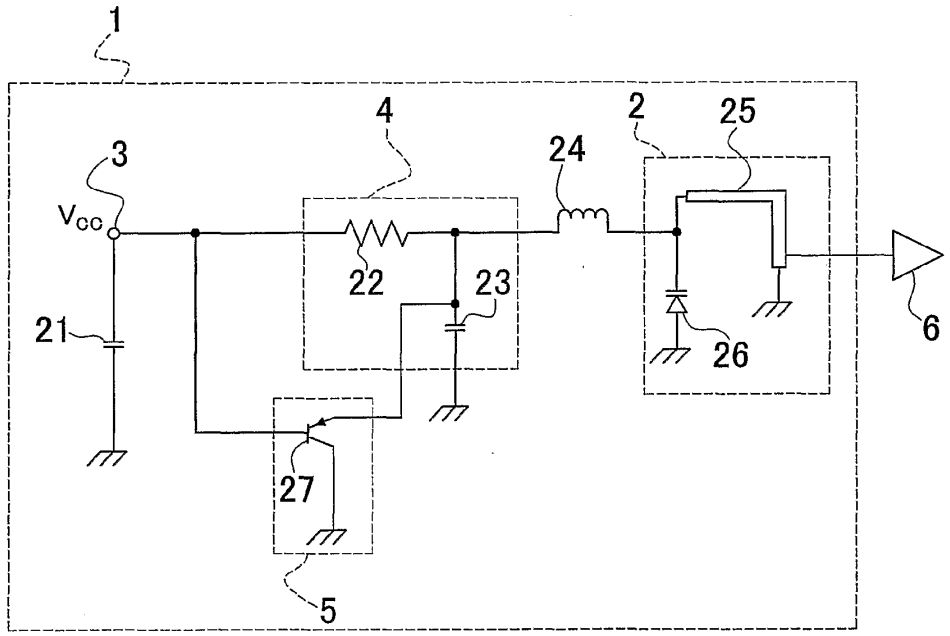
Publication Classification

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

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

(57) **ABSTRACT**

An antenna device includes an antenna unit, a power supply terminal and a time constant circuit. The antenna unit includes an antenna element and a variable capacitance element that is variable in capacitance in accordance with a voltage applied to the variable capacitance element, and resonates in such a manner that the antenna element and the variable capacitance element cooperate with each other. The power supply terminal supplies the voltage applied to the variable capacitance element. The time constant circuit gradually increases the voltage applied to the variable capacitance element when a voltage applied to the power supply terminal is changed from an off state to an on state.



US 20110134007A1

(19) **United States**

(12) **Patent Application Publication**

Miller

(10) **Pub. No.: US 2011/0134007 A1**

(43) **Pub. Date: Jun. 9, 2011**

(54) **FLAT ANTENNA FOR MOBILE USE**

(76) Inventor: **Alan Miller**, Milan, MI (US)

(21) Appl. No.: **12/641,346**

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

(30) **Foreign Application Priority Data**

Dec. 9, 2009 (DE) 102008063802.1

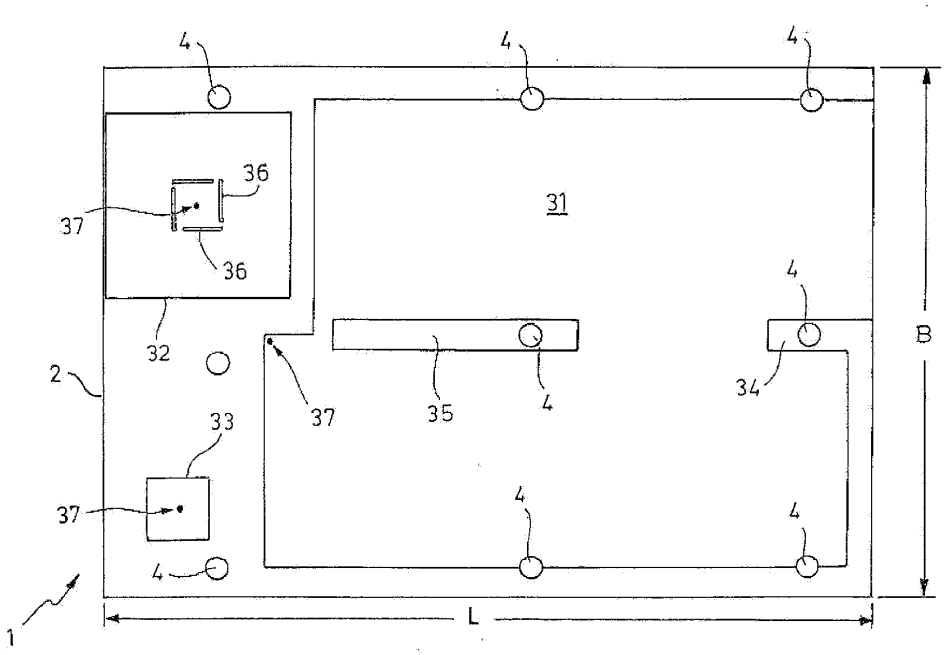
Publication Classification

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

(52) **U.S. Cl.** ..... **343/770**; 343/700 MS; 343/767

(57) **ABSTRACT**

A surface antenna for mobile use has a flat fiberglass base having a thickness of between 7.62 mm (0.300 in) and 12.70 mm (0.50 in), and at least one radiator on the base. The base is coated with a metal on its face lying the face carrying the antenna radiator. This coating forms a ground plane for the surface antenna, so that it can easily be used at the installation site in or on the mobile object.



US 20110134009A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0134009 A1

(43) Pub. Date: Jun. 9, 2011

ONAKA et al.

(54) **MULTIBAND ANTENNA AND MOUNTING STRUCTURE FOR MULTIBAND ANTENNA**

(75) Inventors: **Kengo ONAKA**, Yokohama-shi (JP); **Tsuyoshi MUKAI**, Nagaokakyo-shi (JP); **Munehisa WATANABE**, Yasu-shi (JP)

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

(21) Appl. No.: **12/958,049**

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

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2009/055104, filed on Mar. 17, 2009.

(30) **Foreign Application Priority Data**

Jun. 6, 2008 (JP) 2008-149651

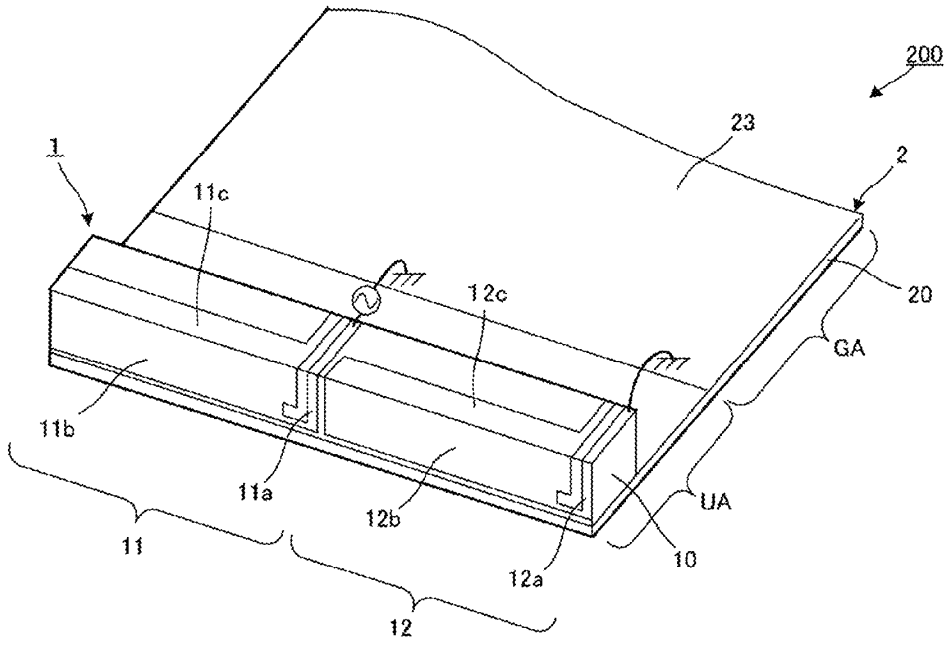
Publication Classification

(51) **Int. Cl.**
H01Q 19/26 (2006.01)

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

(57) **ABSTRACT**

An antenna includes a first LC parallel circuit provided between a feeding element and a feeding circuit, and a second LC parallel circuit provided between a parasitic element and a ground. Multiple resonance frequencies of the feeding element including the feeding radiation electrode and the parasitic element including the parasitic radiation electrode are frequencies intermediate between a low operating frequency and a high operating frequency in a case where the impedances of the first and second LC parallel circuits are set to 0. The inductors of the LC parallel circuits cause the fundamental wave resonance frequencies of the feeding element and the parasitic element to shift to a an operating frequency band on the lower frequency side of the two operating frequency bands, and the capacitors of the LC parallel circuits cause the fundamental wave resonance frequencies of the feeding element and the parasitic element to shift to an operating frequency band on the higher frequency side of the two operating frequency bands.



US 20110134011A1

(19) **United States**

(12) **Patent Application Publication**

Yamagajo

(10) **Pub. No.: US 2011/0134011 A1**

(43) **Pub. Date: Jun. 9, 2011**

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

(75) Inventor: **Takashi Yamagajo**, Kawasaki (JP)

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

(21) Appl. No.: **12/940,386**

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

(30) **Foreign Application Priority Data**

Dec. 4, 2009 (JP) 2009-276696

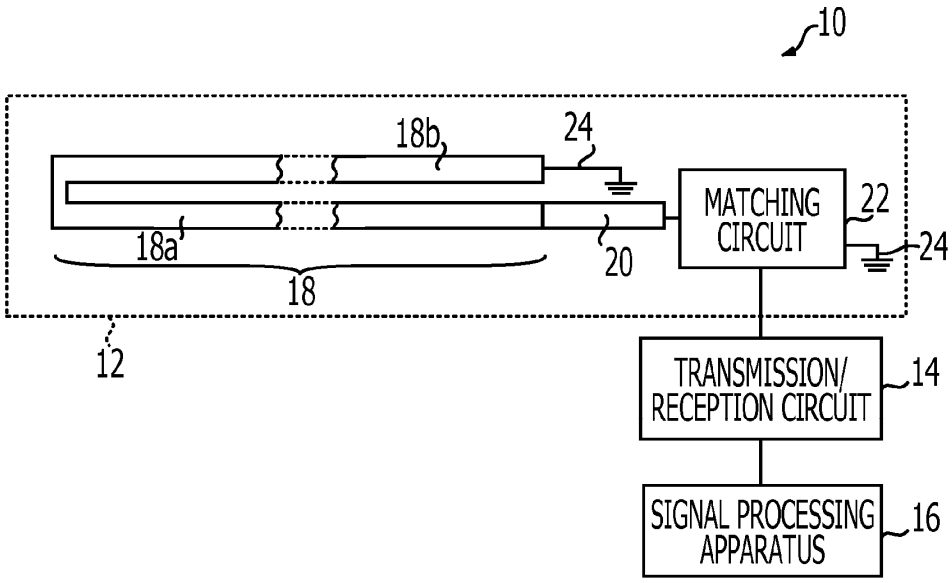
Publication Classification

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

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

(57) **ABSTRACT**

An antenna apparatus includes an antenna linear element including a linear conductor provided with a first end and a second end, a ground conductor connected to the linear conductor at the second end, a transmission line connected to the linear conductor at the first end, and a matching circuit including a first impedance adjustment element connected to the transmission line at an end on an opposite side to the end of transmission line connected to the linear conductor and a second impedance adjustment element which is connected to the first impedance adjustment element on an opposite side to the end of the first impedance adjustment element connected to the transmission line and an end of which on an opposite side to the end connected to the first impedance adjustment element is grounded, a connection part between the first impedance adjustment element and second impedance adjustment element receiving a power feed.



US 20110134014A1

(19) **United States**

(12) **Patent Application Publication**

Kondo et al.

(10) **Pub. No.: US 2011/0134014 A1**

(43) **Pub. Date: Jun. 9, 2011**

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

(75) Inventors: **Toshinori Kondo**, Osaka (JP); **Hiroyuki Takebe**, Osaka (JP); **Mikio Kuramoto**, Osaka (JP)

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

(21) Appl. No.: **13/057,995**

(22) PCT Filed: **May 26, 2010**

(86) PCT No.: **PCT/JP2010/058911**

§ 371 (c)(1),
(2), (4) Date: **Feb. 7, 2011**

(30) **Foreign Application Priority Data**

Jul. 27, 2009 (JP) 2009-174619

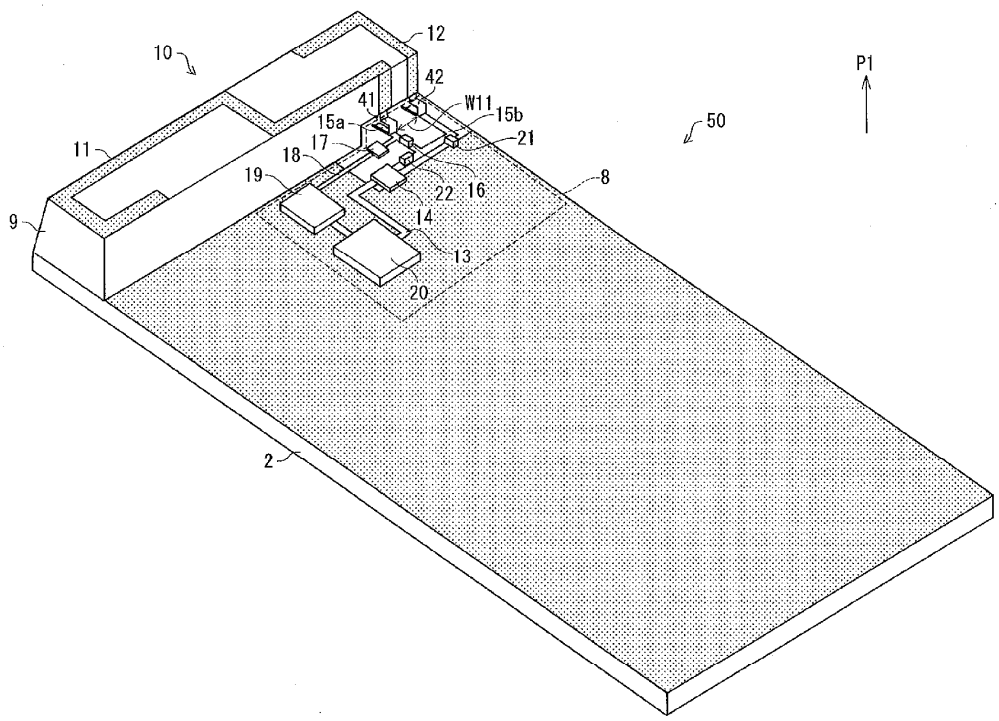
Publication Classification

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

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

(57) **ABSTRACT**

At least three resonance frequencies are obtained by two antenna elements. The antenna device includes antenna elements (**11**) and (**12**), a wireless section (**20**) for supplying power to each of the antenna elements (**11**) and (**12**), a PIN diode (**16**) for electrically connecting and disconnecting the antenna element (**11**) and the wireless section (**20**) with/from each other, the antenna elements (**11**) and (**12**) being provided so as to be capacitively coupled to each other during the electrical disconnection between the antenna element (**11**) and the wireless section (**20**) which electrical disconnection is made by the PIN diode (**16**).



US 20110136378A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2011/0136378 A1**

(43) **Pub. Date: Jun. 9, 2011**

Yamakoshi et al.

(54) **METHOD OF INSTALLING ANTENNA AND COAXIAL CONNECTOR**

(76) Inventors: **Daisuke Yamakoshi**, Tokyo (JP); **Tsuyoshi Nakagawa**, Tokyo (JP)

(21) Appl. No.: **12/961,958**

(22) Filed: **Dec. 7, 2010**

(30) **Foreign Application Priority Data**

Dec. 7, 2009 (JP) 2009-277343

Publication Classification

(51) **Int. Cl.**

H01R 9/05 (2006.01)

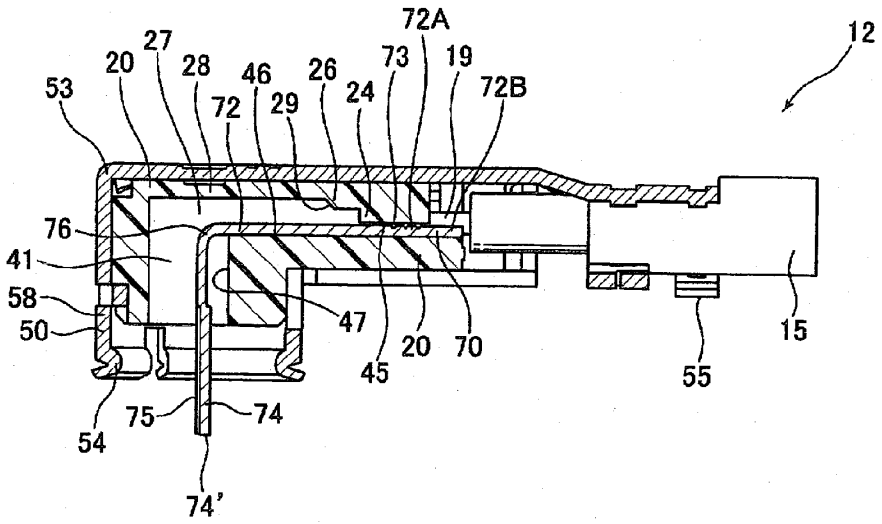
H01P 11/00 (2006.01)

(52) **U.S. Cl.** **439/582**; 29/601

(57) **ABSTRACT**

A coaxial connector to be attached to a coaxial change-over switch includes an insulated connector housing; an outer connector conductor provided outside the insulated connector housing and capable of connecting to an outer conductor of a coaxial cable; and a contact provided in the insulated connector housing to be movable for connecting to a center conductor of the coaxial cable. The contact has a first portion including a distal end portion and a second portion connected to the first portion via a bent section.

The contact is mounted on a mounting section of the insulated connector housing, and is supported in a cantilever state at the second portion. The distal end portion is elastically displaced in a direction opposite to an attaching direction of the coaxial change-over switch when the distal end portion contacts with the coaxial change-over switch.



US 20110136444A1

(19) **United States**

(12) **Patent Application Publication**

Rhodes et al.

(10) **Pub. No.: US 2011/0136444 A1**

(43) **Pub. Date: Jun. 9, 2011**

(54) **TRANSMIT AND RECEIVE ANTENNA**

(76) Inventors: **Mark Rhodes**, West Lothian (GB); **Brendan Hyland**, Edinburgh (GB)

(21) Appl. No.: **12/634,493**

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

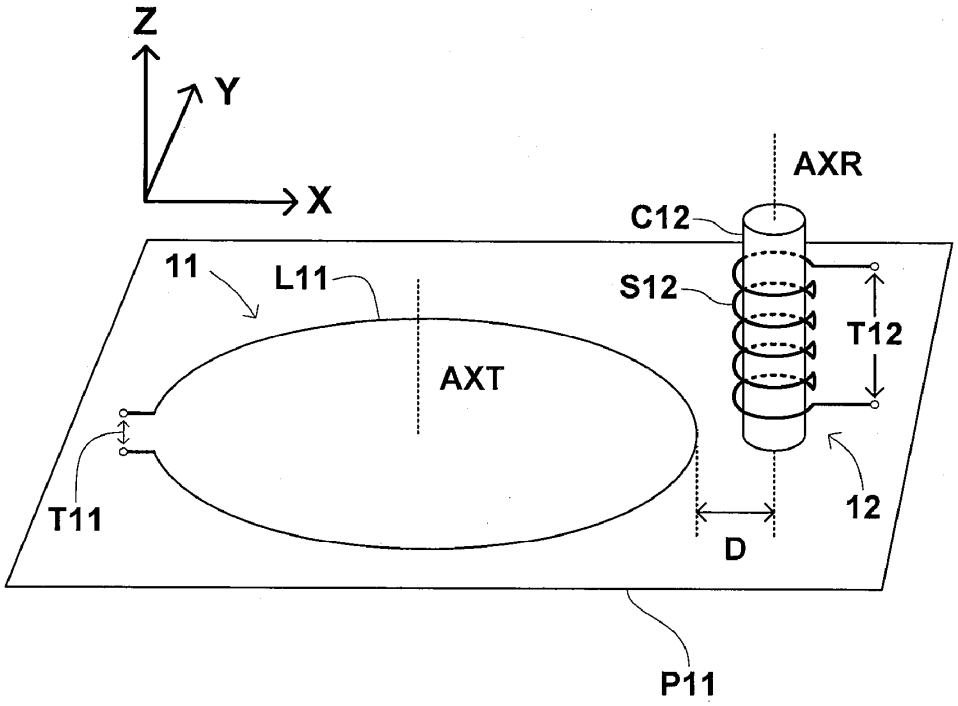
Publication Classification

(51) **Int. Cl.**
H04B 1/44 (2006.01)

(52) **U.S. Cl.** **455/78**

(57) **ABSTRACT**

A transmit/receive antenna for transmission and reception of electromagnetic signals. The transmit/receive antenna comprises a TX section and an RX section, where the TX section comprises a magnetically coupled TX element and a TX input terminal and the RX section comprises at least one magnetically coupled RX element and has an RX output terminal. Axes of the TX loop element and the at least one magnetically coupled RX solenoid element are parallel. Moreover, the at least one magnetically coupled RX element is positioned to provide high isolation at the RX terminal of the antenna from TX electrical signals fed to the TX input. Specifically, the at least one magnetically coupled RX element is positioned at a so that the net magnetic flux generated by the TX loop element and threading the RX solenoid element is zero.



US 20110136447A1

(19) **United States**

(12) **Patent Application Publication**

Pascolini et al.

(10) **Pub. No.: US 2011/0136447 A1**

(43) **Pub. Date: Jun. 9, 2011**

(54) **BEZEL GAP ANTENNAS**

(76) Inventors: **Mattia Pascolini**, Campbell, CA (US); **Robert J. Hill**, Salinas, CA (US); **Juan Zavala**, Watsonville, CA (US); **Nanbo Jin**, Sunnyvale, CA (US); **Qingxiang Li**, Mountain View, CA (US); **Robert W. Schlub**, Campbell, CA (US); **Ruben Caballero**, San Jose, CA (US)

(21) Appl. No.: **12/630,756**

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

Publication Classification

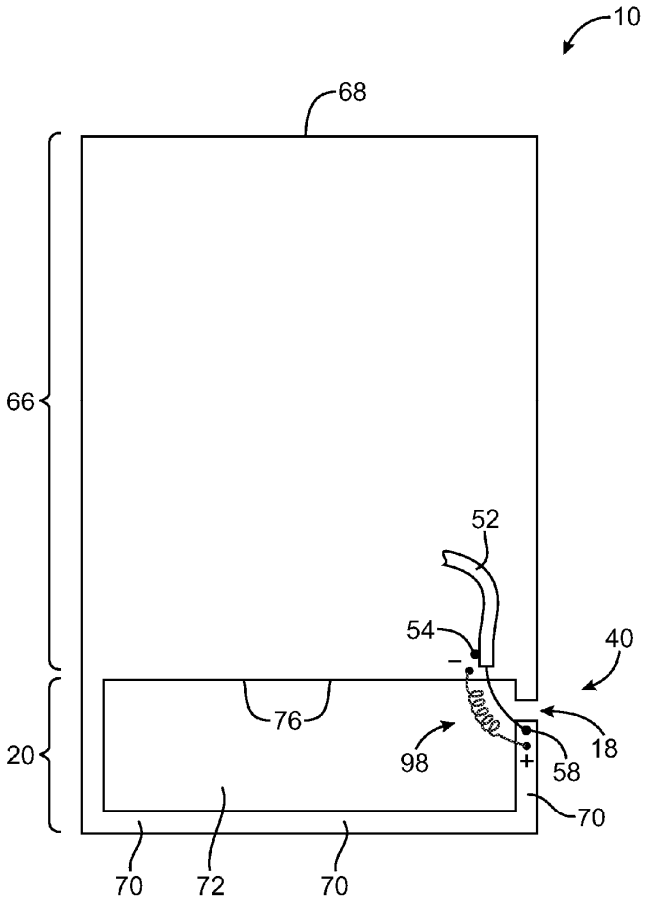
(51) **Int. Cl.**

H04B 1/38	(2006.01)
H01Q 1/50	(2006.01)
H01Q 1/24	(2006.01)
H01Q 21/00	(2006.01)

(52) **U.S. Cl.** **455/90.2**; 343/850; 343/702; 343/867

(57) **ABSTRACT**

Electronic devices are provided that contain wireless communications circuitry. The wireless communications circuitry may include radio-frequency transceiver circuitry and antenna structures. A parallel-fed loop antenna may be formed from portions of an electronic device bezel and a ground plane. The antenna may operate in multiple communications bands. An impedance matching circuit for the antenna may be formed from a parallel-connected inductive element and a series-connected capacitive element. The bezel may surround a peripheral portion of a display that is mounted to the front of an electronic device. The bezel may contain a gap. Antenna feed terminals for the antenna may be located on opposing sides of the gap. The inductive element may bridge the gap and the antenna feed terminals. The capacitive element may be connected in series between one of the antenna feed terminals and a conductor in a transmission line located between the transceiver circuitry and the antenna.



US 20110140859A1

(19) **United States**

(12) **Patent Application Publication**

Fogg et al.

(10) **Pub. No.: US 2011/0140859 A1**

(43) **Pub. Date: Jun. 16, 2011**

(54) **RADIO FREQUENCY IDENTIFICATION TAGGING**

(75) Inventors: **Martin Fogg**, (US); **Christopher Gordon Gervase Turner**, (US)

(73) Assignee: **ZIH Corp.**, Hamilton (BM)

(21) Appl. No.: **13/034,563**

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

Related U.S. Application Data

(63) Continuation of application No. 12/140,639, filed on Jun. 17, 2008, now Pat. No. 7,920,096, which is a continuation of application No. 10/527,736, filed on Mar. 14, 2005, now Pat. No. 7,400,298, filed as application No. PCT/GB2003/003939 on Sep. 12, 2003.

(30) **Foreign Application Priority Data**

Sep. 12, 2002 (GB) 0221111.8

Publication Classification

(51) **Int. Cl.**

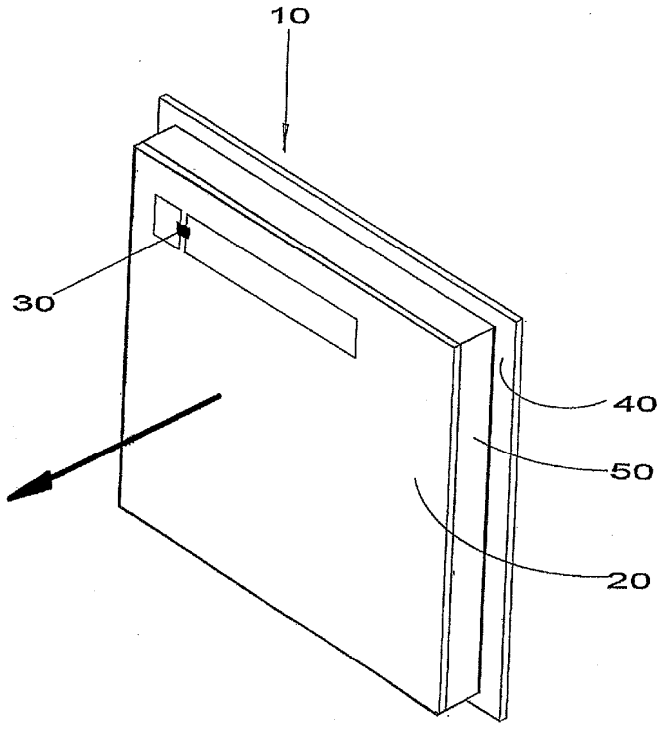
G06K 7/01 (2006.01)

H01Q 1/22 (2006.01)

(52) **U.S. Cl.** **340/10.1**; 343/720

(57) **ABSTRACT**

A RFID tag or label comprises a RFID tag module (comprising an electronic identification circuit and a coupling means) and an antenna structure coupled to the coupling means. The RFID tag module is separate from, separable or arranged to be severable from, the antenna structure. The tag module can be placed in or on an object and the antenna structure in or on packaging material for use with the object. A patch antenna type RFID tag antenna structure has a ground plane spaced from the patch antenna so as to increase the range of the tag. The ground plane is not substantially larger than, and electrically insulated from, the patch antenna. The ground plane is flexible, so the RFID tag structure can be worn by a human, and can be incorporated into a piece of clothing. A RFID antenna structure for use with a tag reader is made flat and robust so that it can be mounted on the ground to be walked upon or driven over. A bi-directional YAGI type RFID tag antenna structure has director elements on two opposite sides so that the YAGI antenna radiates in two opposite directions. An object includes a gain increasing metallic structure for increasing the gain of a RFID tag when placed near the object so as to form a RFID tag antenna structure.



US 20110140973A1

(19) **United States**

(12) **Patent Application Publication**

Yamagajo et al.

(10) **Pub. No.: US 2011/0140973 A1**

(43) **Pub. Date: Jun. 16, 2011**

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

(75) Inventors: **Takashi Yamagajo**, Kawasaki (JP); **Yasumitsu Ban**, Kawasaki (JP); **Shinsuke Shimahashi**, Kawasaki (JP); **Kouji Soekawa**, Kawasaki (JP)

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

(21) Appl. No.: **12/961,700**

(22) Filed: **Dec. 7, 2010**

(30) **Foreign Application Priority Data**

Dec. 11, 2009 (JP) 2009-281390

Publication Classification

(51) **Int. Cl.**

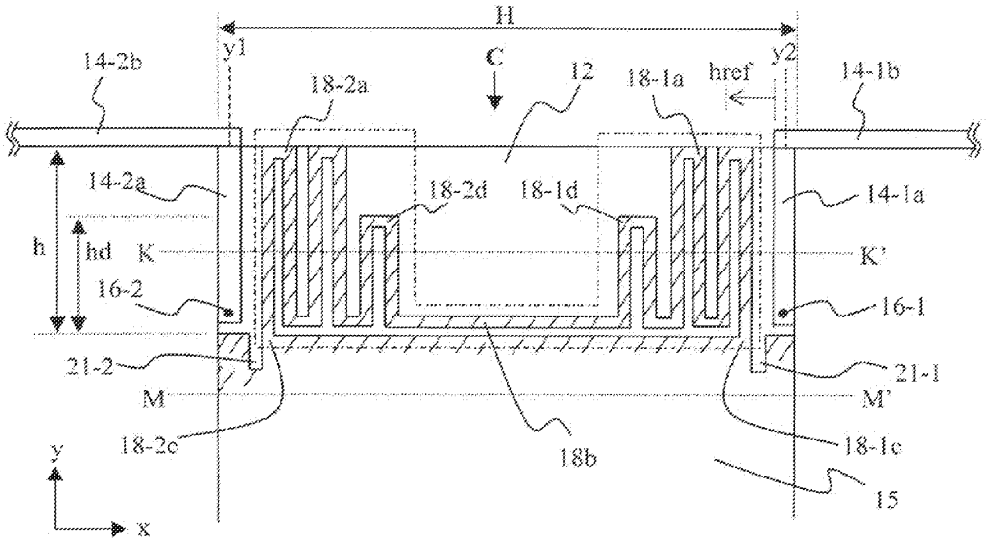
H01Q 9/04 (2006.01)

H01Q 1/24 (2006.01)

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

(57) **ABSTRACT**

An antenna apparatus including: a first and second antenna elements which transmit or receive radio signal; a ground pattern; and a wiring pattern which is provided on a line segment connecting the first and second antenna elements, and directly connected to the ground pattern, wherein a circumventing path is formed by the wiring pattern and a part of the ground pattern.



US 20110140978A1

(19) **United States**

(12) **Patent Application Publication**

Maruyama

(10) **Pub. No.: US 2011/0140978 A1**

(43) **Pub. Date: Jun. 16, 2011**

(54) **ANTENNA DEVICE**

(75) Inventor: **Akihiro Maruyama**, Kanagawa (JP)

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

(21) Appl. No.: **12/928,117**

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

(30) **Foreign Application Priority Data**

Dec. 11, 2009 (JP) 2009-282113
Sep. 14, 2010 (KR) 10-2010-0090029

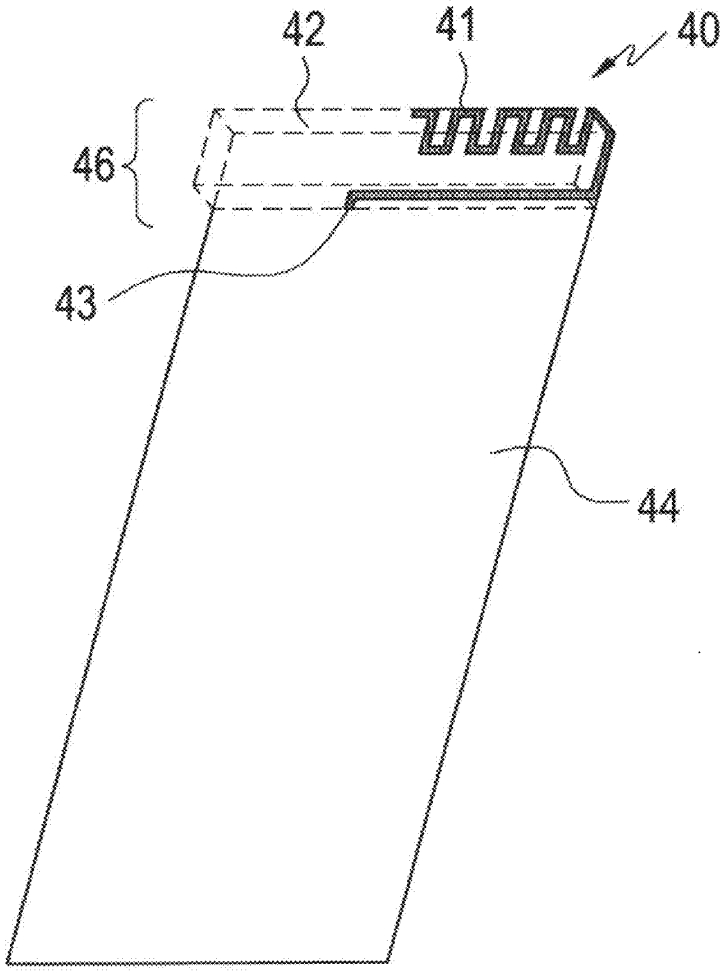
Publication Classification

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

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

(57) **ABSTRACT**

An antenna device includes a ground plate, a dielectric body disposed at an end of the ground plate, an L-shaped foldable antenna disposed at one side of the dielectric body, a wide-band monopole antenna disposed at an opposite side of the dielectric body, and a power supply disposed between the L-shaped foldable antenna and the wide-band monopole antenna.



US 20110140981A1

(19) **United States**

(12) **Patent Application Publication**

Yukimoto et al.

(10) **Pub. No.: US 2011/0140981 A1**

(43) **Pub. Date: Jun. 16, 2011**

(54) **ANTENNA DEVICE**

(75) Inventors: **Shinsuke Yukimoto**, Tokyo (JP); **Takao Yokoshima**, Tokyo (JP)

(73) Assignees: **MITSUBISHI CABLE INDUSTRIES, LTD.**, Tokyo (JP); **MITSUBISHI MATERIALS CORPORATION**, Tokyo (JP)

(21) Appl. No.: **12/992,707**

(22) PCT Filed: **May 14, 2009**

(86) PCT No.: **PCT/JP2009/002105**

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

(30) **Foreign Application Priority Data**

May 15, 2008 (JP) 2008-128867
Apr. 28, 2009 (JP) 2009-108897

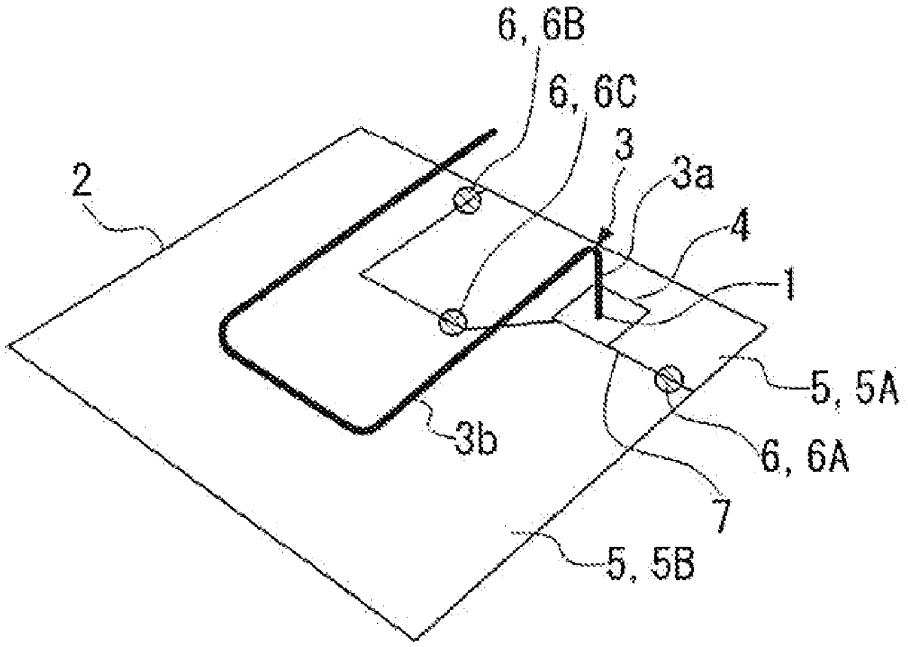
Publication Classification

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

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

(57) **ABSTRACT**

An antenna device, wherein the polarization is improved by an identical antenna or substrate, and a higher gain and a smaller size are provided even when the installation conditions are changed. The antenna includes a base provided with a power feed point electrically connected to a power feed unit in a wireless circuit, an antenna element set up on the base and electrically connected to the power feed point, and a ground pattern provided on the base. The antenna element includes a rise part which rises from the base and an element part extending from the top edge of the rise in any direction in the plane parallel to the base. The ground pattern is divided into at least two ground regions by a boundary, and a ground connection part which electrically and locally connects the ground regions.



US 20110140986A1

(19) **United States**

(12) **Patent Application Publication**

KUO

(10) **Pub. No.: US 2011/0140986 A1**

(43) **Pub. Date: Jun. 16, 2011**

(54) **ANTENNA ASSEMBLY WITH IMPROVED SUPPORTING DEVICE**

(75) Inventor: **PETER KUO**, Tu-Cheng (TW)

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

(21) Appl. No.: **12/965,939**

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

(30) **Foreign Application Priority Data**

Dec. 11, 2009 (TW) 98223197

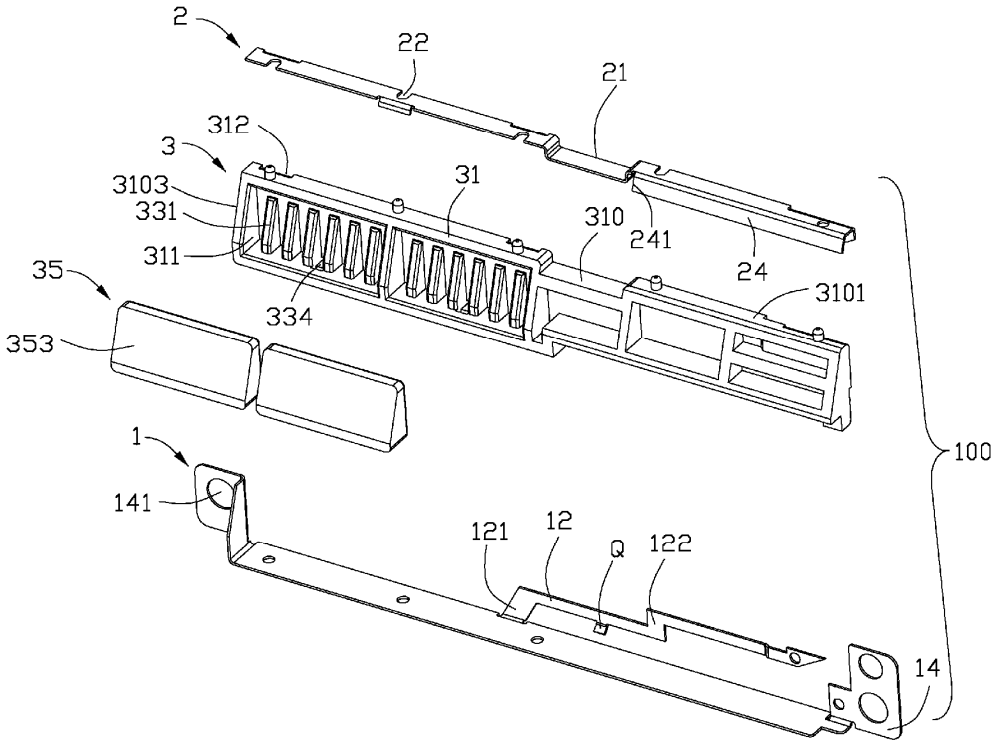
Publication Classification

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

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

(57) **ABSTRACT**

An antenna assembly includes an antenna and a supporting portion. The antenna includes a radiating element, a grounding element and a connecting element connecting the radiating element and the grounding element. The supporting portion is located between the radiating element and the grounding element, and includes a base portion and a complementary portion assembled on the base portion. The complementary portion has an outer surface being flush with one of the surfaces of the base portion.



US 20110140987A1

(19) **United States**

(12) **Patent Application Publication**

Ito et al.

(10) **Pub. No.: US 2011/0140987 A1**

(43) **Pub. Date: Jun. 16, 2011**

(54) **CHIP ANTENNA**

(75) Inventors: **Jun Ito**, Fukushima (JP); **Yuichi Baba**, Fukushima (JP)

(73) Assignee: **KANTATSU CO., LTD.**, Yaita-shi, Tochigi (JP)

(21) Appl. No.: **12/737,689**

(22) PCT Filed: **Aug. 12, 2009**

(86) PCT No.: **PCT/JP2009/064478**

§ 371 (c)(1),
(2), (4) Date: **Feb. 24, 2011**

(30) **Foreign Application Priority Data**

Aug. 12, 2008 (JP) 2008-207700

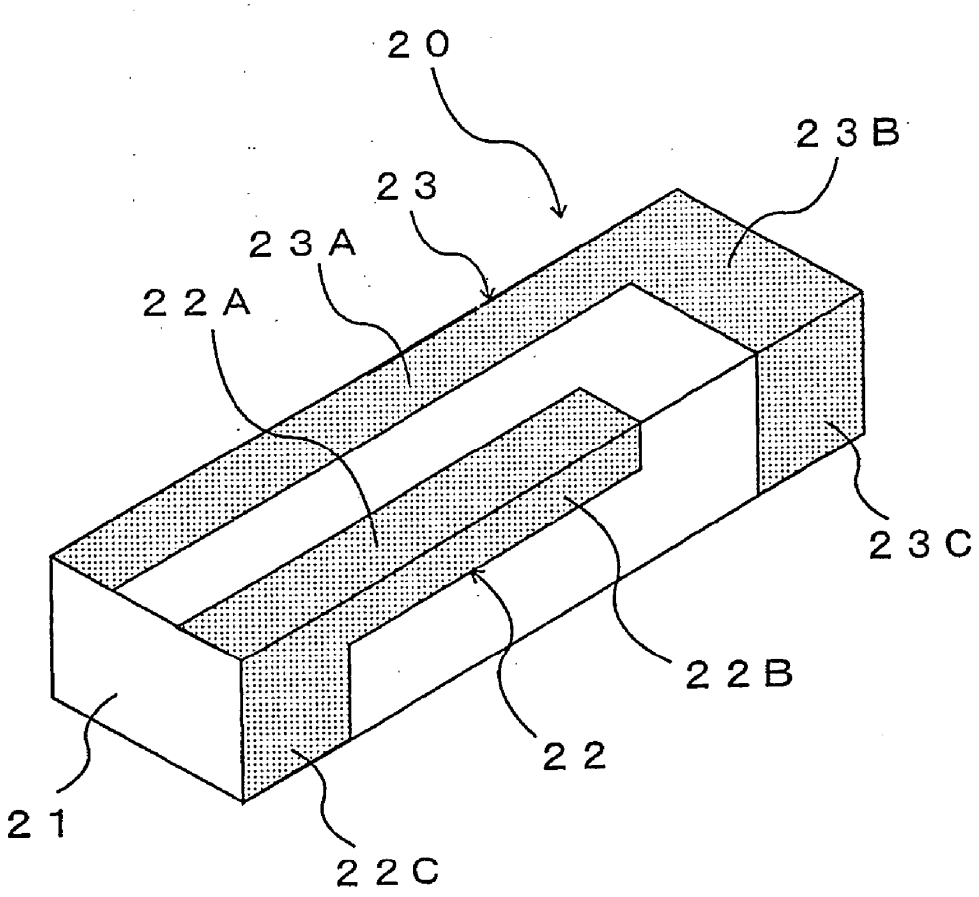
Publication Classification

(51) **Int. Cl.**
H01Q 21/28 (2006.01)

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

(57) **ABSTRACT**

This invention provides a chip antenna which is adaptable to a plurality of frequency bands. It is possible to transmit and receive radio waves in two frequency bands by forming a first antenna element portion **12** and a second antenna element portion **13** having different element lengths on a base body **11** of a chip antenna **10**. Radio waves having a high linearity in 3.5 GHz band and 5.8 GHz band can be robustly transmitted and received by forming the first antenna element portion **12** and the second antenna element portion **13** in parallel each other in a longitudinal direction of the base body **11**.



US 20110148687A1

(19) **United States**

(12) **Patent Application Publication**

Wright et al.

(10) **Pub. No.: US 2011/0148687 A1**

(43) **Pub. Date: Jun. 23, 2011**

(54) **ADJUSTABLE ANTENNA**

(75) Inventors: **Donald Wright**, Orlando, FL (US); **Jeffery Carter May**, Melbourne, FL (US)

(73) Assignee: **L-3 COMMUNICATIONS CYTERRA CORPORATION**, Orlando, FL (US)

(21) Appl. No.: **12/971,343**

(22) Filed: **Dec. 17, 2010**

Related U.S. Application Data

(60) Provisional application No. 61/287,999, filed on Dec. 18, 2009.

Publication Classification

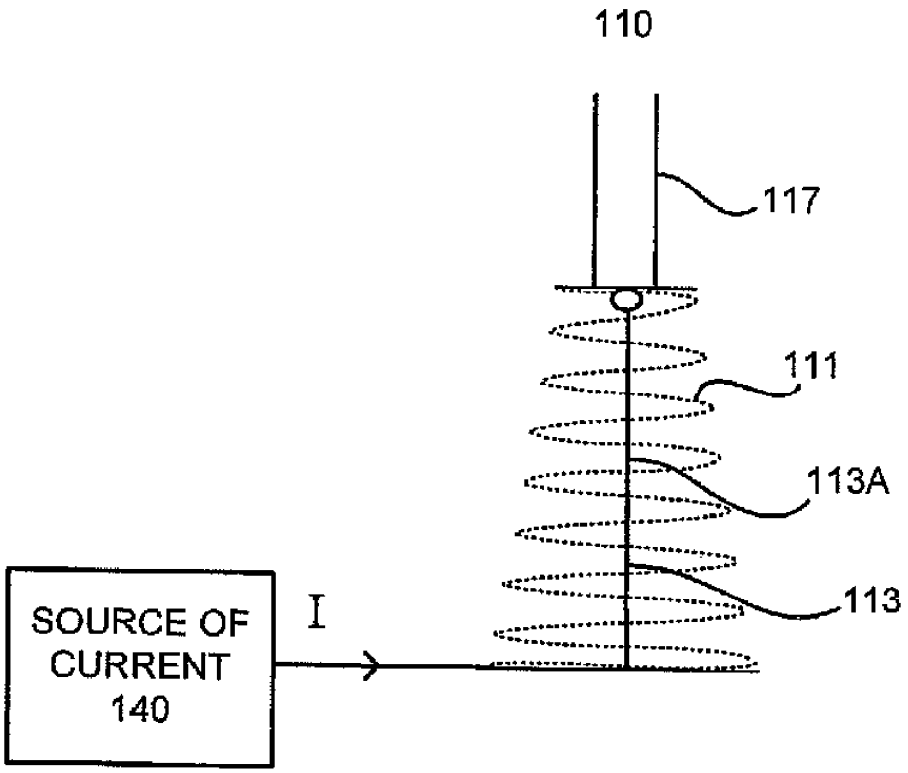
(51) **Int. Cl.**

G01S 13/00	(2006.01)
H01Q 1/24	(2006.01)
H01Q 3/01	(2006.01)
G01S 13/08	(2006.01)
G01S 13/04	(2006.01)

(52) **U.S. Cl.** **342/22**; 343/757; 343/702; 343/758; 342/118; 342/27

(57) **ABSTRACT**

A device includes a compressible conductive element including a first end and a second end, and an adjustment element coupled to the compressible conductive element, the adjustment element configured to adjust the compressible conductive element to a state of compression between an uncompressed mode and a compressed mode. The compressible conductive element is configured to couple to a source of electrical current at the first end and to radiate electromagnetic energy from the second end.



US 20110148715A1

(19) **United States**

(12) **Patent Application Publication**

YANG

(10) **Pub. No.: US 2011/0148715 A1**

(43) **Pub. Date: Jun. 23, 2011**

(54) **PATCH ANTENNA AND MINIATURIZING METHOD THEREOF**

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

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

(21) Appl. No.: **12/710,368**

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

(30) **Foreign Application Priority Data**

Dec. 21, 2009 (CN) 200910311917.2

Publication Classification

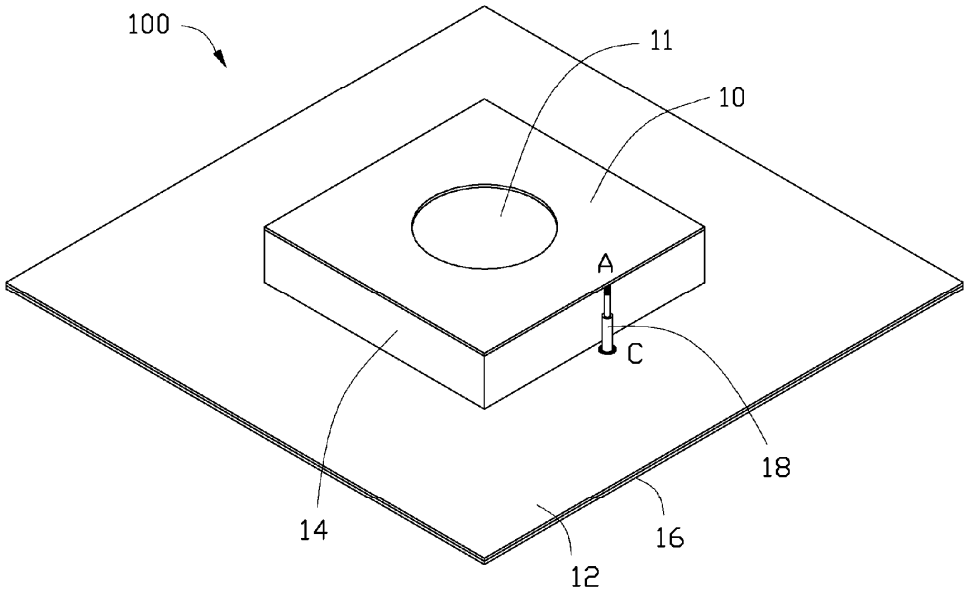
(51) **Int. Cl.**

H01Q 1/38 (2006.01)
H01P 11/00 (2006.01)
H01Q 9/04 (2006.01)

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

(57) **ABSTRACT**

A miniaturizing method for a patch antenna includes following steps: providing a patch antenna comprising a radiator; setting at least one through hole on the radiator to change the current distance of the patch antenna, the changed current distance being equal to an expected current distance; and forming a miniature patch antenna.



US 20110148716A1

(19) **United States**

(12) **Patent Application Publication**

SOTOMA et al.

(10) **Pub. No.: US 2011/0148716 A1**

(43) **Pub. Date: Jun. 23, 2011**

(54) **MULTIPLE RESONANCE ANTENNA, MANUFACTURING METHOD THEREFOR AND COMMUNICATION DEVICE**

(75) Inventors: **Naoki SOTOMA**, Tokyo (JP); **Hideaki Shimoda**, Tokyo (JP); **Junichiro Urabe**, Tokyo (JP); **Noriyuki Hirabayashi**, Tokyo (JP)

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

(21) Appl. No.: **12/967,706**

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

(30) **Foreign Application Priority Data**

Dec. 18, 2009 (JP) 2009-287495

Publication Classification

(51) **Int. Cl.**

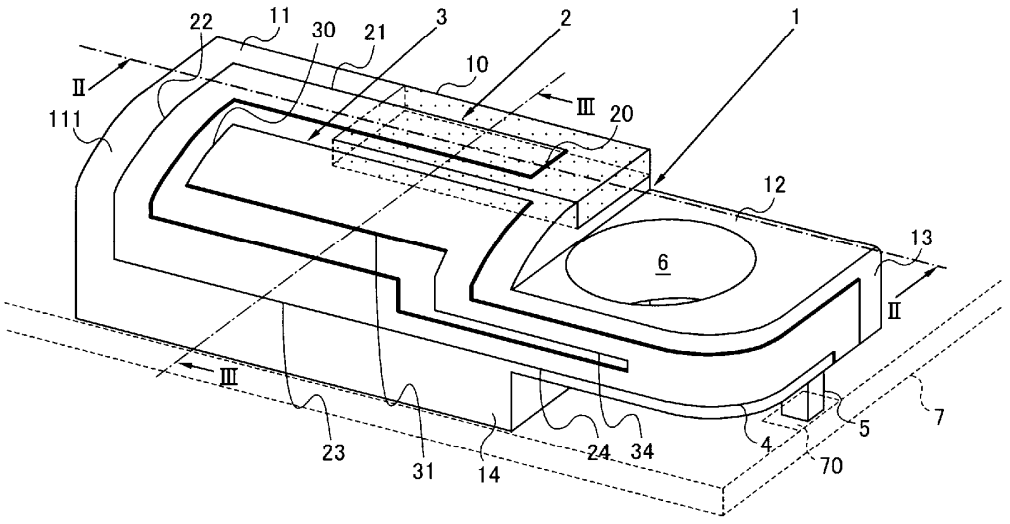
H01Q 1/38 (2006.01)

H01P 11/00 (2006.01)

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

(57) **ABSTRACT**

A multiple resonance antenna includes a dielectric substrate, a first antenna electrode and a second antenna electrode, the first and second antenna electrodes being disposed together on the dielectric substrate with first ends connected to each other but with second ends remaining free, the dielectric substrate including a high-dielectric part having a higher relative permittivity than another part, the high-dielectric part being disposed beneath a part of the first antenna electrode including the second end.



US 20110148718A1

(19) **United States**

(12) **Patent Application Publication**

Wang et al.

(10) **Pub. No.: US 2011/0148718 A1**

(43) **Pub. Date: Jun. 23, 2011**

(54) **METHOD AND APPARATUS FOR AN ANTENNA**

(75) Inventors: **Hanyang Wang**, Abingdon (GB); **Pekka Halme**, Espoo (FI); **Michael Holland**, Fleet (GB); **Ali Mehmed**, London (GB); **Ming Zheng**, Farnborough (GB); **Alan Johnson**, Frimley (GB); **Weiwen Liu**, Woking (GB); **Catherine Islip**, Farnborough (GB); **Niels B. Larsen**, Kgs Lyngby (DK)

(73) Assignee: **Nokia Corporation**

(21) Appl. No.: **12/655,134**

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

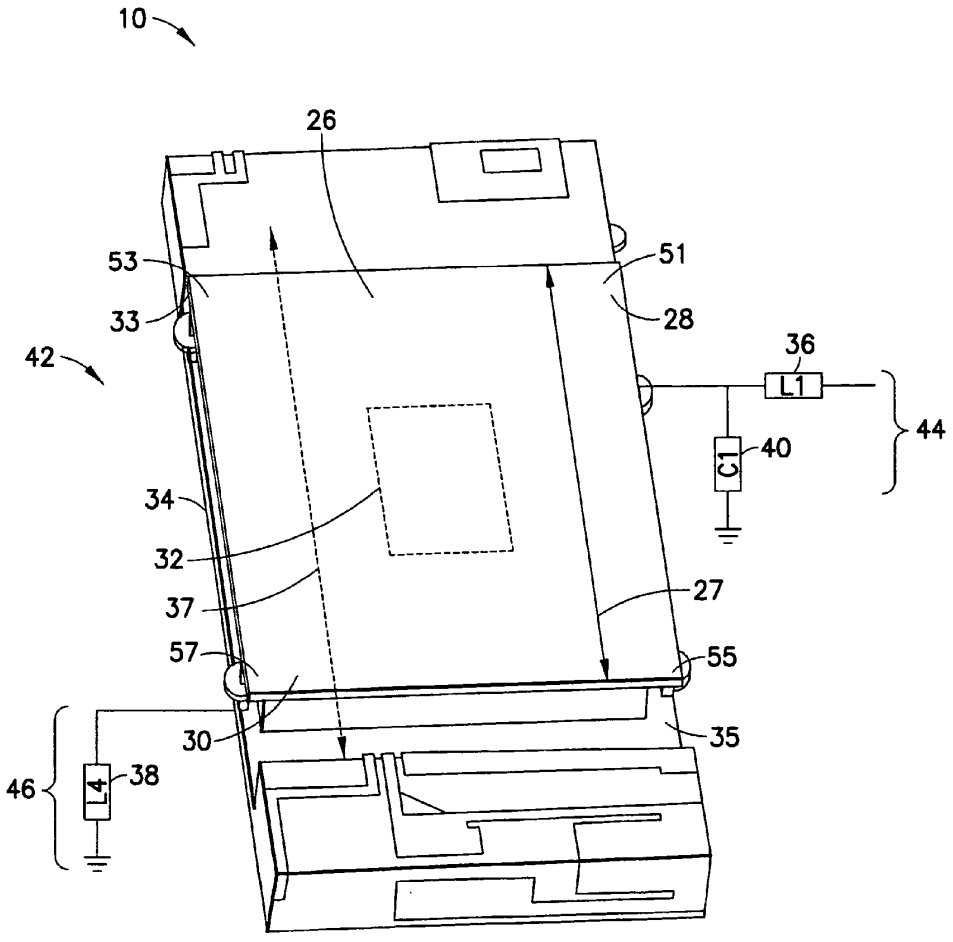
Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01P 11/00 (2006.01)

(52) **U.S. Cl.** **343/702**; 29/601

(57) **ABSTRACT**

In accordance with one example embodiment of the present invention an apparatus is disclosed. The apparatus includes a cover, a ground plane, a first inductor, and a second inductor. The cover includes a first end and an opposite second end. The cover is configured to operate as a first loop radiator portion. The ground plane is proximate the cover. The ground plane is configured to operate as a second loop radiator portion. The first inductor is proximate the first end of the cover. The second inductor is between the second end of the cover and the ground plane. The cover, the ground plane, the first inductor, and the second inductor are configured to provide a loop radiator.



US 20110148719A1

(19) **United States**

(12) **Patent Application Publication**

Okajima

(10) **Pub. No.: US 2011/0148719 A1**

(43) **Pub. Date: Jun. 23, 2011**

(54) **PORTABLE WIRELESS DEVICE**

(76) Inventor: **Yusuke Okajima**, Osaka (JP)

(21) Appl. No.: **13/059,737**

(22) PCT Filed: **Dec. 7, 2009**

(86) PCT No.: **PCT/JP2009/070496**

§ 371 (c)(1),
(2), (4) Date: **Feb. 18, 2011**

(30) **Foreign Application Priority Data**

Feb. 9, 2009 (JP) 2009-027620

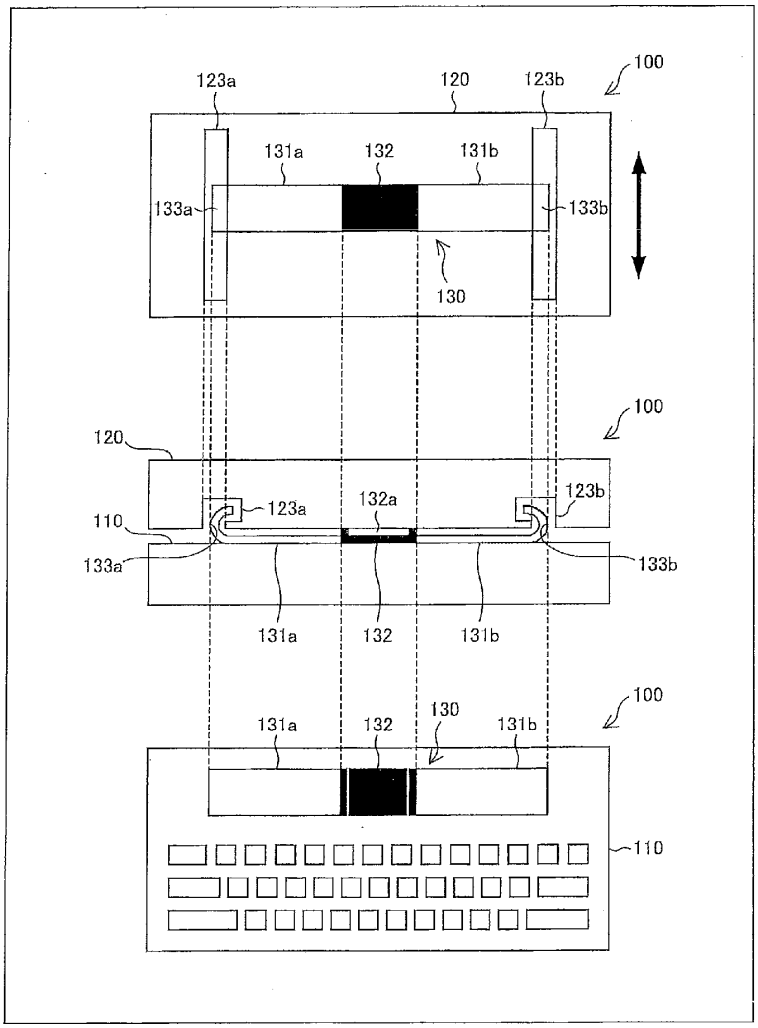
Publication Classification

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

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

(57) **ABSTRACT**

A mobile phone terminal (portable wireless device) of the present invention includes: a first housing; a slide plate fixed to the first housing; a second housing slidably attached to the slide plate; and an antenna attached to the first housing. The slide plate is constituted by a conductive part made from a metal and a nonconductive part made from an insulating material. The nonconductive part is provided so as to extend across the slide plate. According to the arrangement, it is possible to suppress a reduction in gain of the antenna, which reduction is generated due to a resonance current flowing through the slide plate in the portable wireless device.



US 20110148723A1

(19) **United States**

(12) **Patent Application Publication**

Bengtsson et al.

(10) **Pub. No.: US 2011/0148723 A1**

(43) **Pub. Date: Jun. 23, 2011**

(54) **TUNABLE ANTENNA ARRANGEMENT**

(76) Inventors: **Erik Bengtsson**, Eslov (SE); **Richard Breiter**, Fredriksberg (DK)

(21) Appl. No.: **12/999,454**

(22) PCT Filed: **Jun. 23, 2008**

(86) PCT No.: **PCT/EP08/57977**

§ 371 (c)(1), (2), (4) Date: **Feb. 1, 2011**

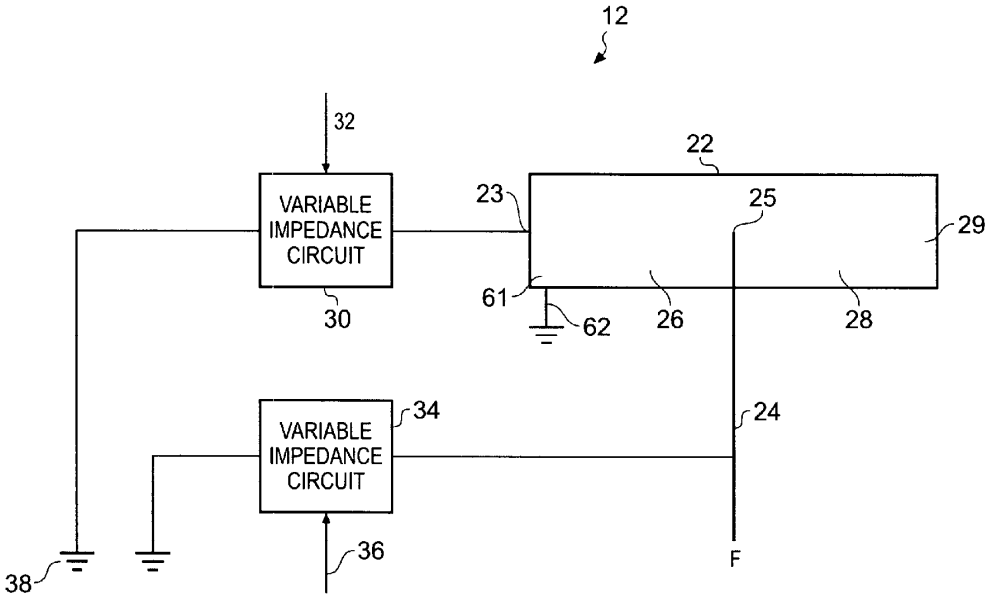
Publication Classification

(51) **Int. Cl.**
H01Q 11/04 (2006.01)

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

(57) **ABSTRACT**

An antenna arrangement including an antenna; a first variable impedance circuit connected between ground and a first point of the antenna; and a second variable impedance circuit connected between ground and a second point of the antenna and a connection from a third point of the antenna to ground wherein; the first point of the antenna and the second point of the antenna are separated along the length of the antenna and the impedance of the first variable impedance circuit and the second variable impedance circuit control the resonant frequency of the antenna arrangement.



US 20110148724A1

(19) **United States**

(12) **Patent Application Publication**

Ogawa

(10) **Pub. No.: US 2011/0148724 A1**

(43) **Pub. Date: Jun. 23, 2011**

(54) **ANTENNA DEVICE**

(75) Inventor: **Kenji Ogawa**, Kanagawa (JP)

(73) Assignee: **Panasonic Corporation**, Kadoma-shi, OSAKA (JP)

(21) Appl. No.: **13/059,625**

(22) PCT Filed: **Aug. 11, 2009**

(86) PCT No.: **PCT/JP2009/003865**

§ 371 (c)(1), (2), (4) Date: **Feb. 17, 2011**

(30) **Foreign Application Priority Data**

Aug. 29, 2008 (JP) 2008-221598

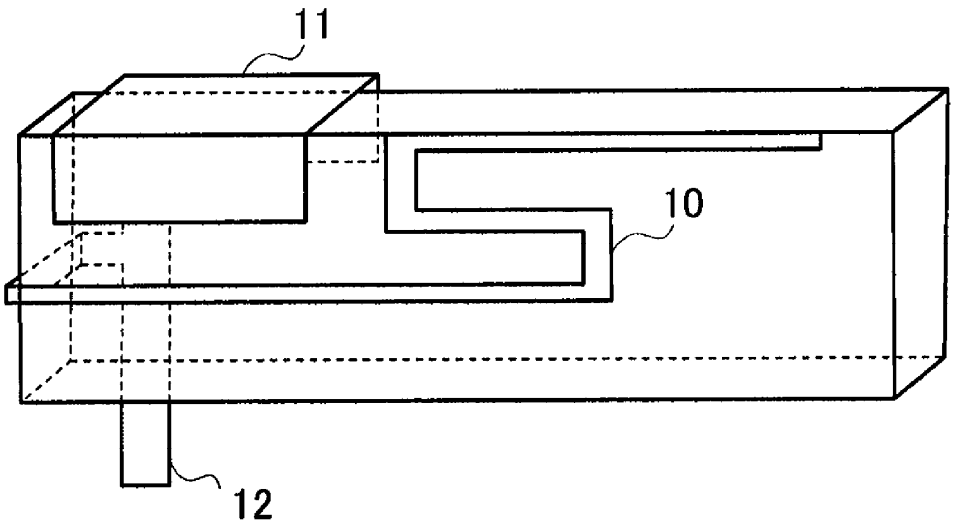
Publication Classification

(51) **Int. Cl.**
H01Q 13/18 (2006.01)
H01Q 9/06 (2006.01)

(52) **U.S. Cl.** **343/767**; 343/843

(57) **ABSTRACT**

Disclosed is an antenna device that achieves greater reduction in size and a wider bandwidth. The antenna device has a box-type antenna element (**102**) and a folded-back monopole element (**107**), which are connected. The device is grounded via a grounding terminal (**103**) at one apex of the box-type antenna element (**102**), and is also connected to an electricity supply unit (**106**) of a substrate (**101**) via a feed terminal (**105**) at the apex which forms a long side with the grounded apex. In addition, the length from the grounding point (**104**) of the box-type antenna element (**102**) to the tip of the monopole element (**107**) is set to one-quarter the wavelength of a first resonant frequency, and the length from the electricity supply unit (**106**) to the tip of the monopole element (**107**) is set to one-quarter the wavelength of a second resonant frequency.



US 20110148726A1

(19) **United States**

(12) **Patent Application Publication**

CHANG et al.

(10) **Pub. No.: US 2011/0148726 A1**

(43) **Pub. Date: Jun. 23, 2011**

(54) **DUAL BAND ANTENNA**

(76) Inventors: **Jin-Su CHANG**, Hsinchu County (TW); **Kuo-Chang Lo**, Miaoli County (TW)

(21) Appl. No.: **12/869,144**

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

(30) **Foreign Application Priority Data**

Dec. 23, 2009 (TW) 098144532

Publication Classification

(51) **Int. Cl.**

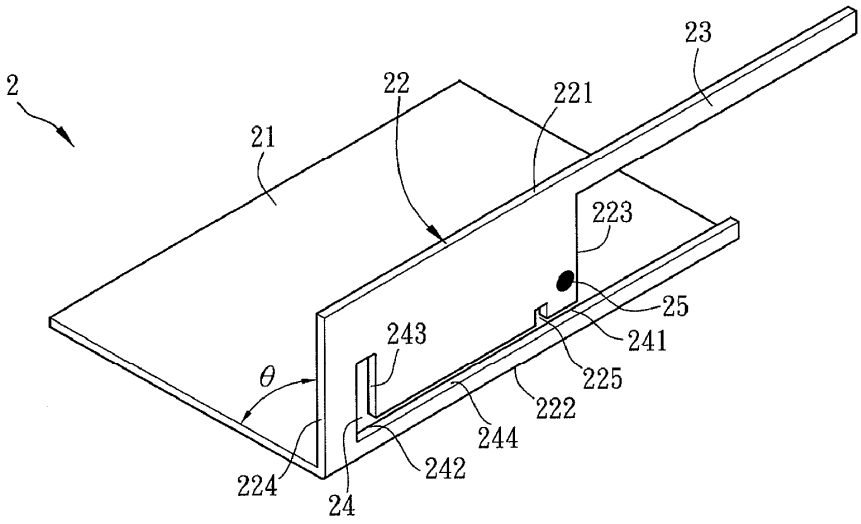
H01Q 5/01 (2006.01)

H01Q 13/10 (2006.01)

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

(57) **ABSTRACT**

A dual band antenna includes a grounding portion, a connection portion, a radiating portion, a radiating groove and a feeding portion. The connection portion has a top side and a bottom side disposed relatively, and has a first edge side and a second edge side connected to the top side and the bottom side. The bottom side of the connecting portion is connected with the grounding portion. The radiation portion is protruded from the first edge side of the connecting portion and neighboring to the top side of the connecting portion. The radiation groove is disposed on the inside of the connecting portion and neighboring to the second edge side and bottom side of the connecting portion, and has a opening located on the first edge side of the connecting portion. The feeding portion is formed on the connecting portion and neighboring to the opening of the radiation groove. The radiation portion is operated at a first band width and the radiation groove is operated at a second band width to make the dual band antenna of this invention work in two different bands.



US 20110148728A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0148728 A1

(43) Pub. Date: Jun. 23, 2011

YOSHIOKA

(54) **CHIP ANTENNA**

(75) Inventor: **Hiroki YOSHIOKA**, Kawasaki-shi (JP)

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

(21) Appl. No.: **12/971,206**

(22) Filed: **Dec. 17, 2010**

(30) **Foreign Application Priority Data**

Dec. 22, 2009 (JP) 2009-289960

Publication Classification

(51) **Int. Cl.**

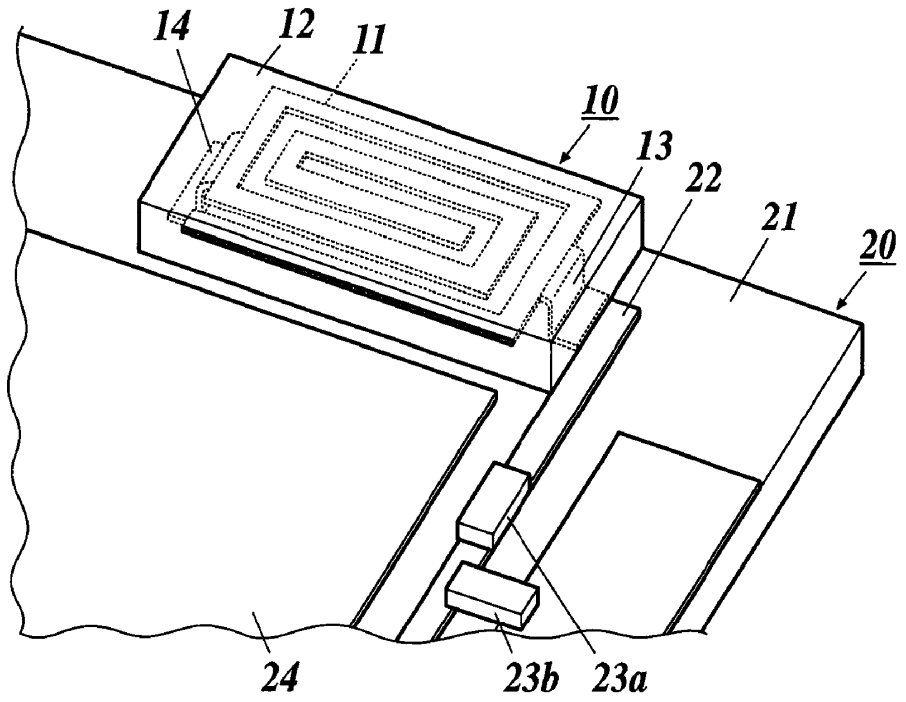
H01Q 1/00 (2006.01)

H01Q 1/36 (2006.01)

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

(57) **ABSTRACT**

Disclosed is a chip antenna comprising: a base portion including a dielectric, a magnetic substance or a magnetic dielectric; a spiral antenna electrode which is opposed to a ground portion and which is provided inside the base portion; and a power feeding connecting terminal to feed power to the antenna electrode, wherein a first side portion including an outermost peripheral end of the antenna electrode, or a second side portion connected to the first side portion including the outermost peripheral end, is disposed at a position closest to the ground portion at a predetermined distance away from the ground portion, and the power feeding connecting terminal is connected to a side portion extending in a direction substantially perpendicular to the ground portion.



US 20110148731A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0148731 A1

(43) Pub. Date: Jun. 23, 2011

Asrani et al.

(54) **ANTENNA SYSTEM WITH NON-RESONATING STRUCTURE**

(75) Inventors: **Vijay Asrani**, Round Lake, IL (US); **Adrian Napoles**, Lake Villa, IL (US); **Louis Vannatta**, Crystal Lake, IL (US)

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

(21) Appl. No.: **12/645,038**

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

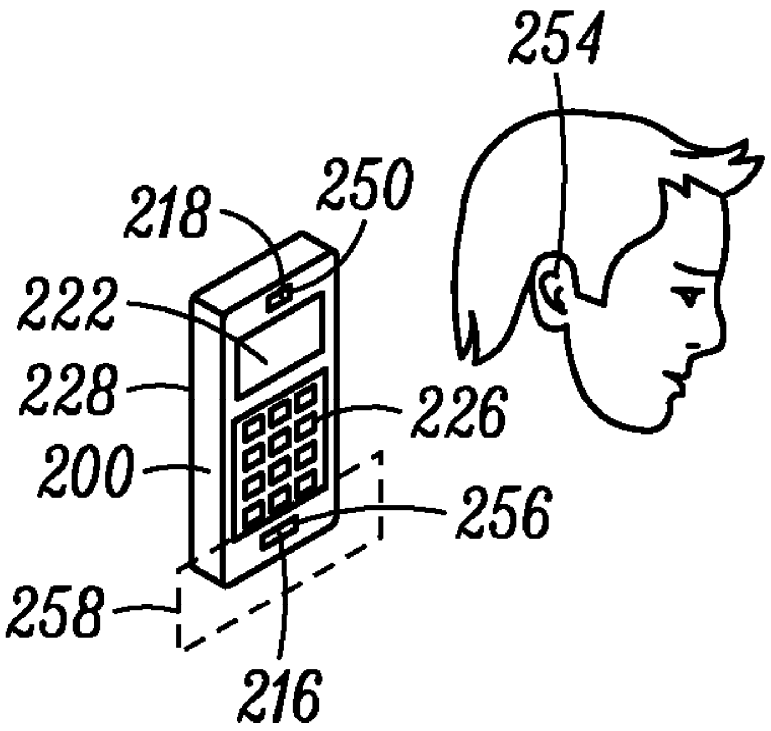
Publication Classification

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

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

(57) **ABSTRACT**

An antenna system for reception and transmission of radio frequency (RF) signals and a method for tuning the antenna system are provided. The antenna system includes a ground plane, a first element and a second element. The first element includes a driven unbalanced antenna element that resonates within at least one predetermined first frequency band to transmit and receive radio frequency (RF) signals modulated at one or more frequencies within the at least one predetermined first frequency band. The second element is non-resonating within the at least one predetermined first frequency band and is located within an antenna volume of the first element to create a partial loop response within the antenna volume of the first element by capacitively coupling to the first element when connected to the ground plane.



US 20110148732A1

(19) **United States**

(12) **Patent Application Publication**

Azulay

(10) **Pub. No.: US 2011/0148732 A1**

(43) **Pub. Date: Jun. 23, 2011**

(54) **MULTI-ANTENNA MULTIBAND SYSTEM**

(76) Inventor: **Snir Azulay**, Tiberias (IL)

(21) Appl. No.: **12/810,402**

(22) PCT Filed: **May 23, 2010**

(86) PCT No.: **PCT/IL10/00407**

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

Related U.S. Application Data

(60) Provisional application No. 61/180,472, filed on May 22, 2009, provisional application No. 61/270,200, filed on Jul. 2, 2009.

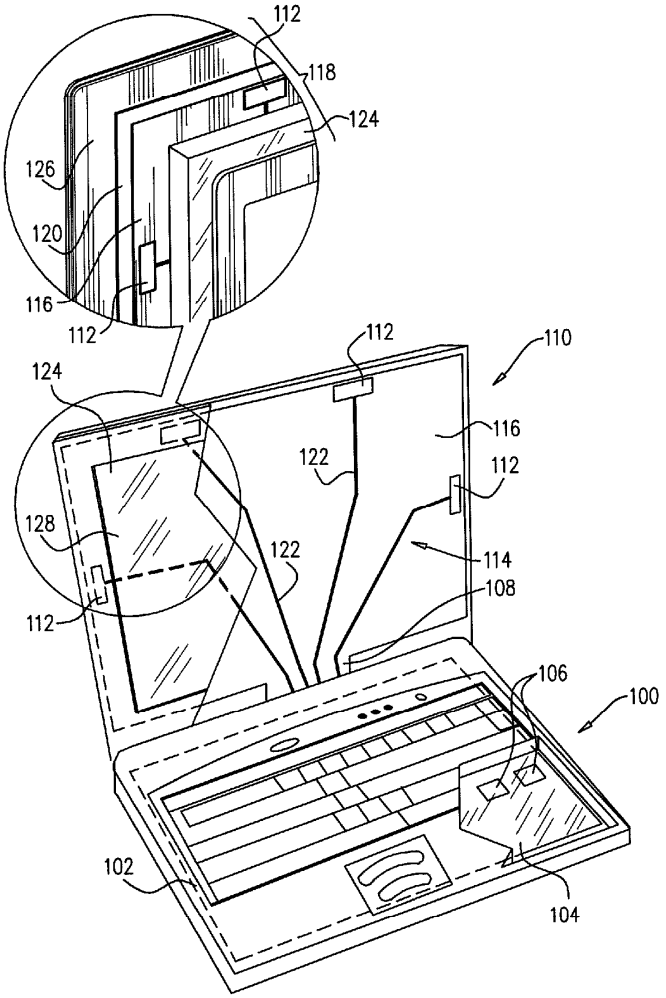
Publication Classification

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

(52) **U.S. Cl.** **343/853**

(57) **ABSTRACT**

An antenna system including at least one flexible dielectric sheet, a plurality of individual antennas mounted on the at least one flexible dielectric sheet, a feed network mounted on the at least one flexible dielectric sheet, the feed network being connected to and feeding the individual antennas and at least one conductive ground plane mounted on the at least one flexible dielectric sheet.



US 20110148735A1

(19) **United States**

(12) **Patent Application Publication**

YANG et al.

(10) **Pub. No.: US 2011/0148735 A1**

(43) **Pub. Date: Jun. 23, 2011**

(54) **DUAL-BAND ANTENNA**

(75) Inventors: **CHIH-YUAN YANG**, Tu-Cheng (TW); **CHIEN-TANG LIN**, Tu-Cheng (TW); **MING-LIANG YANG**, Tu-Cheng (TW)

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

(21) Appl. No.: **12/873,207**

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

(30) **Foreign Application Priority Data**

Dec. 22, 2009 (CN) 200910312008.0

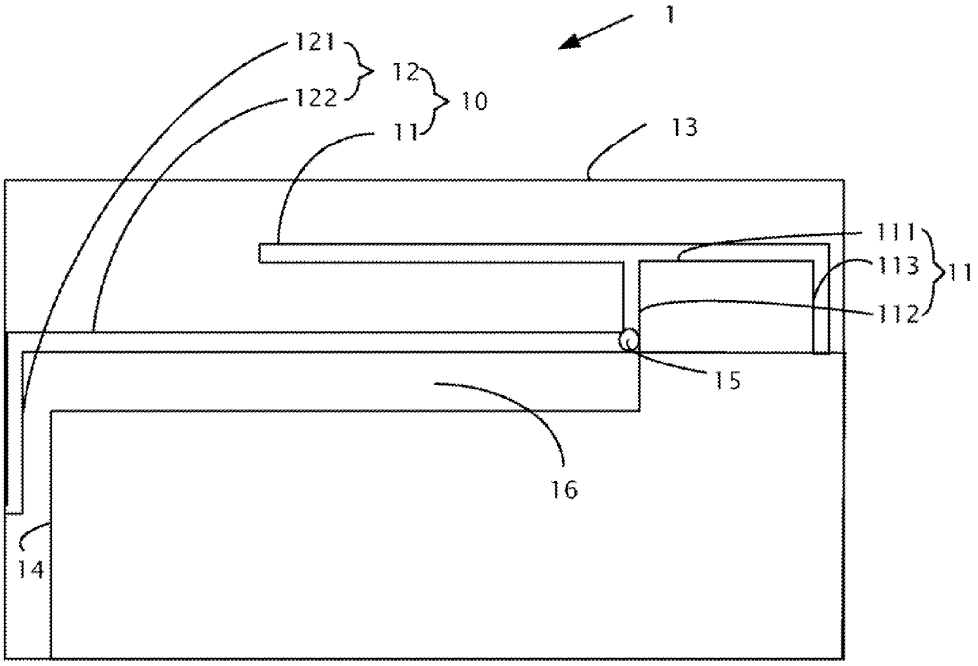
Publication Classification

(51) **Int. Cl.**
H01Q 21/28 (2006.01)

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

(57) **ABSTRACT**

A dual-band antenna includes a RF connector, a radiation element, and a ground surface. The RF connector is connected to a RF receiver. The radiation element includes a first radiation element and a second radiation element. The first radiation element and the second radiation element are both connected to the RF connector. The RF connector is connected to the ground surface.



US 20110148736A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0148736 A1

(43) Pub. Date: Jun. 23, 2011

Choi et al.

(54) **MULTI-INPUT MULTI-OUTPUT ANTENNA FOR IMPROVING ISOLATION**

(75) Inventors: **Jae-Hoon Choi**, Seoul (KR); **Jae-Ick Choi**, Daejeon (KR); **Dong-Ho Kim**, Daejeon-si (KR); **Hae-Il Jung**, Seoul (KR); **Jung-Pyo Kim**, Seoul (KR); **Young-Ki Lee**, Jeju-si (KR)

(73) Assignee: **Electronics and Telecommunications Research Institute**, Daejeon-si (KR)

(21) Appl. No.: **12/900,730**

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

(30) **Foreign Application Priority Data**

Dec. 18, 2009 (KR) 10-2009-0127249

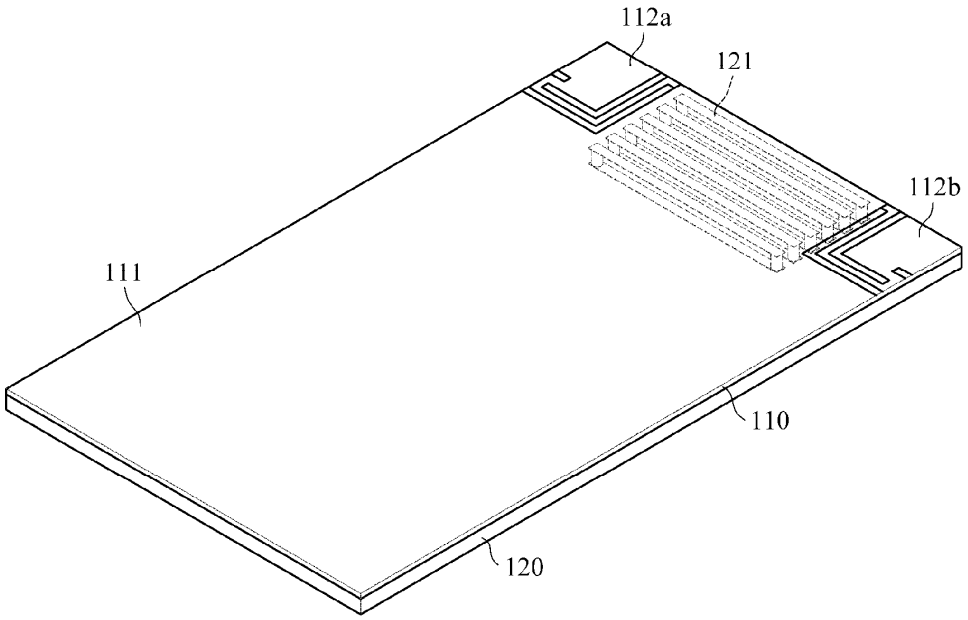
Publication Classification

(51) **Int. Cl.**
H01Q 1/52 (2006.01)
H01Q 21/00 (2006.01)

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

(57) **ABSTRACT**

A multi-input multi-output (MIMO) antenna for improving isolation is provided. Split ring resonators (SRRs) are structurally arranged on the lower end of a ground surface between a plurality of antenna patterns spaced apart from each other. Accordingly, permeability of the SRRs has a negative value, which prevents current from flowing between antennas. Consequently, the isolation characteristic of the antennas is improved.



US 20110151949A1

(19) **United States**

(12) **Patent Application Publication**

Wen et al.

(10) **Pub. No.: US 2011/0151949 A1**

(43) **Pub. Date: Jun. 23, 2011**

(54) **MULTIPLE-BAND ANTENNA WITH PATCH AND SLOT STRUCTURES**

(75) Inventors: **Geyi Wen**, Waterloo (CA); **Perry Jarmuszewski**, Waterloo (CA); **Adam D. Stevenson**, Waterloo (CA)

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

(21) Appl. No.: **13/038,540**

(22) Filed: **Mar. 2, 2011**

Related U.S. Application Data

(63) Continuation of application No. 12/331,518, filed on Dec. 10, 2008, now Pat. No. 7,916,087, which is a continuation of application No. 11/838,751, filed on Aug. 14, 2007, now Pat. No. 7,466,271, which is a continuation of application No. 11/456,025, filed on Jul. 6, 2006, now Pat. No. 7,283,097, which is a continuation of application No. 10/723,840, filed on Nov. 26, 2003, now Pat. No. 7,224,312.

(30) **Foreign Application Priority Data**

Nov. 28, 2002 (CA) PCT/CA02/01842

Publication Classification

(51) **Int. Cl.**

H04W 88/02	(2009.01)
H01Q 13/10	(2006.01)
H01Q 5/01	(2006.01)
H01P 11/00	(2006.01)

(52) **U.S. Cl.** **455/575.7**; 343/770; 29/600

(57) **ABSTRACT**

A multiple-band antenna having first and second operating frequency bands is provided. The antenna includes a first patch structure associated primarily with the first operating frequency band, a second patch structure electrically coupled to the first patch structure and associated primarily with the second operating frequency band, a first slot structure disposed between a first portion of the first patch structure and the second patch structure and associated primarily with the first operating frequency band, and a second slot structure disposed between a second portion of the first patch structure and the second patch structure and associated primarily with the second operating frequency band. A mounting structure for the multiple-band antenna is also provided. The mounting structure includes a first surface and a second surface opposite to and overlapping the first surface. The first and second patch structures are mounted to the first surface, and a feeding point and ground point, respectively connected to the first and second patch structures, are mounted to the second surface.