US 20120293368A1

(19) **United States**

(12) **Patent Application Publication**

Yang et al.

(10) **Pub. No.: US 2012/0293368 A1**

(43) **Pub. Date: Nov. 22, 2012**

(54) **MOBILE WIRELESS COMMUNICATIONS DEVICE INCLUDING ANTENNA ASSEMBLY HAVING SPACED APART PARALLEL CONDUCTOR ARMS AND RELATED METHODS**

(75) Inventors: **Shing Lung Steven Yang**, Schaumburg, IL (US); **Firass Mirza Badaruzzaman**, Oak Park, IL (US); **Brian Francisco Rojas**, Chicago, IL (US)

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

(21) Appl. No.: **13/112,202**

(22) Filed: **May 20, 2011**

Publication Classification

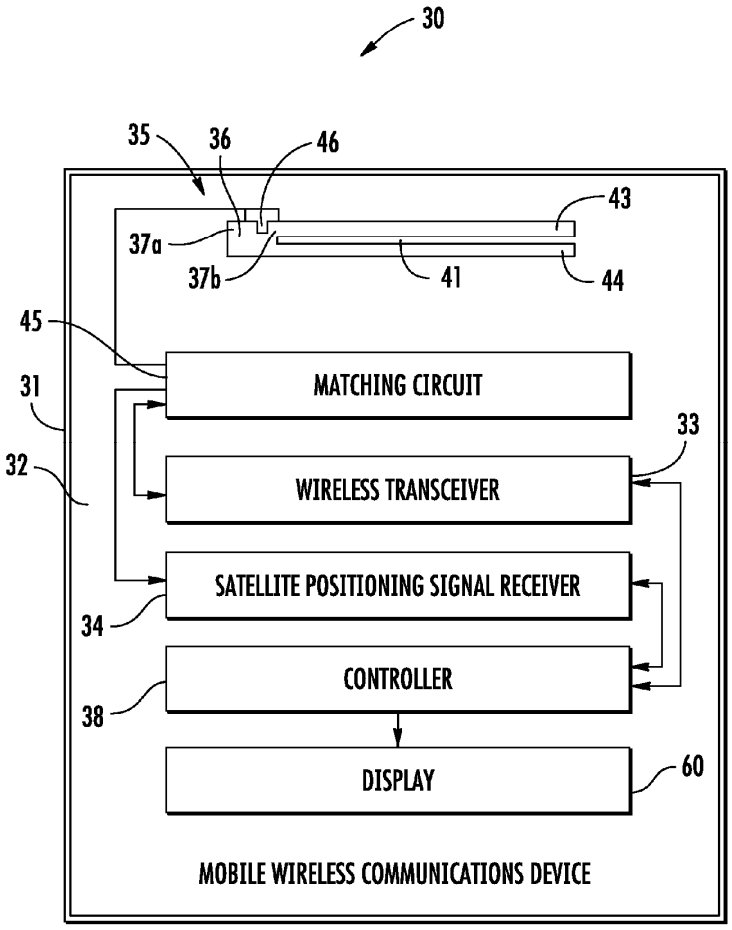
(51) **Int. Cl.**

G01S 19/35	(2010.01)
H01P 11/00	(2006.01)
H01Q 1/24	(2006.01)

(52) **U.S. Cl.** **342/357.75**; 343/702; 29/600

(57) **ABSTRACT**

A mobile wireless communications device may include a portable housing, at least one wireless transceiver carried by the portable housing, and at least one satellite positioning signal receiver carried by the portable housing. The mobile wireless communications device may also include an antenna assembly carried by the portable housing. The antenna assembly may include a base electrical conductor having a pair of antenna feed points defined therein and coupled to the at least one wireless transceiver and the at least one satellite signal positioning receiver. The antenna assembly may also include first and second conductor arms being spaced apart, parallel, and extending outwardly from the base electrical conductor.



US 20120293376A1

(19) **United States**

(12) **Patent Application Publication**

HUNG et al.

(10) **Pub. No.: US 2012/0293376 A1**

(43) **Pub. Date: Nov. 22, 2012**

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

(75) Inventors: **TZU-CHIEH HUNG**, TAICHUNG CITY (TW); **SAOU-WEN SU**, KEELUNG CITY (TW)

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

(21) Appl. No.: **13/184,042**

(22) Filed: **Jul. 15, 2011**

(30) **Foreign Application Priority Data**

May 19, 2011 (CN) 201110129520.9

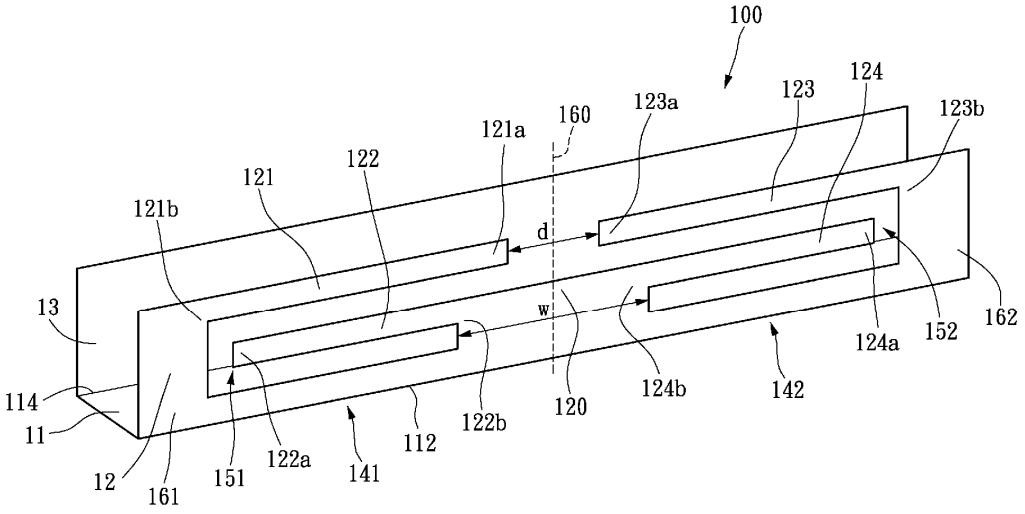
Publication Classification

(51) **Int. Cl.**
H01Q 1/52 (2006.01)
H01Q 1/24 (2006.01)

(52) **U.S. Cl.** **343/702**; 343/841

(57) **ABSTRACT**

A multi-band antenna includes a grounding portion, a main radiating portion, and a shielding wall. The main radiating portion includes a first radiating portion having a first feed end and a second radiating portion having a second feed end. The first and second radiating portions are structurally symmetrical. The main radiating portion and the shielding wall are arranged on opposite sides of the grounding portion.



US 20120293377A1

(19) **United States**

(12) **Patent Application Publication**

Liang et al.

(10) **Pub. No.: US 2012/0293377 A1**

(43) **Pub. Date: Nov. 22, 2012**

(54) **DISPLAY DEVICE HAVING DIRECTIONAL ANTENNA**

(76) Inventors: **Jia-Haur Liang**, New Taipei City (TW); **Wen-Ping Yu**, New Taipei City (TW)

(21) Appl. No.: **13/225,471**

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

(30) **Foreign Application Priority Data**

May 18, 2011 (TW) 100117413

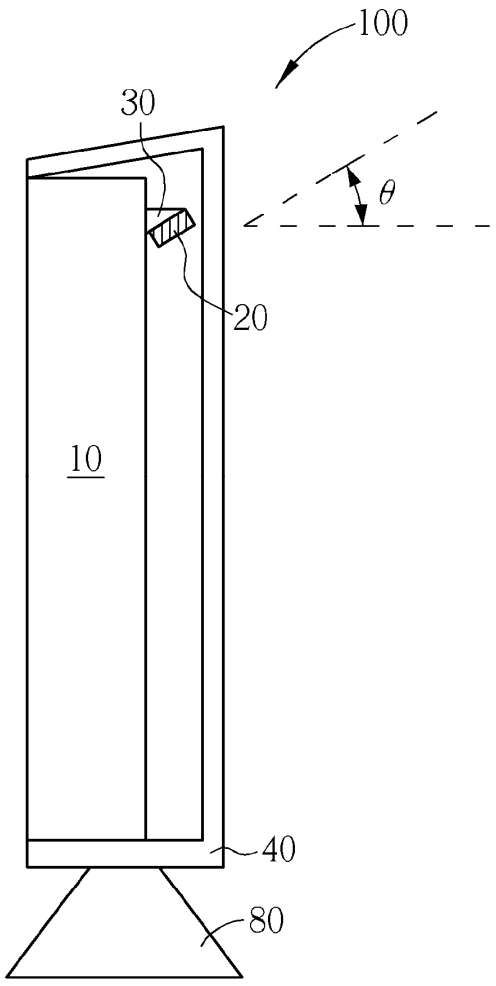
Publication Classification

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

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

(57) **ABSTRACT**

A display device includes a display panel and a directional antenna. The directional antenna is disposed behind or under the display panel for radiating or receiving wireless signals. The radiating path of the directional antenna is at a specific angle with respect to a horizontal plane for receiving surrounding wireless signals. Or, the signals radiated from the directional antenna may be reflected or refracted to regions above or in front of the display device by a back-side barrier or penetrate a back-side barrier which does not cause large electromagnetic degradation, thereby receiving wireless signals originated from the front-side or back-side of the display device.



US 20120293378A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0293378 A1

(43) Pub. Date: Nov. 22, 2012

von Arbin

(54) **ANTENNA ARRANGEMENT FOR A PORTABLE RADIO COMMUNICATION DEVICE HAVING A METAL CASING**

(76) Inventor: **Axel von Arbin**, Taby (SE)

(21) Appl. No.: **13/470,501**

(22) Filed: **May 14, 2012**

(30) **Foreign Application Priority Data**

May 17, 2011 (EP) 11166376.1

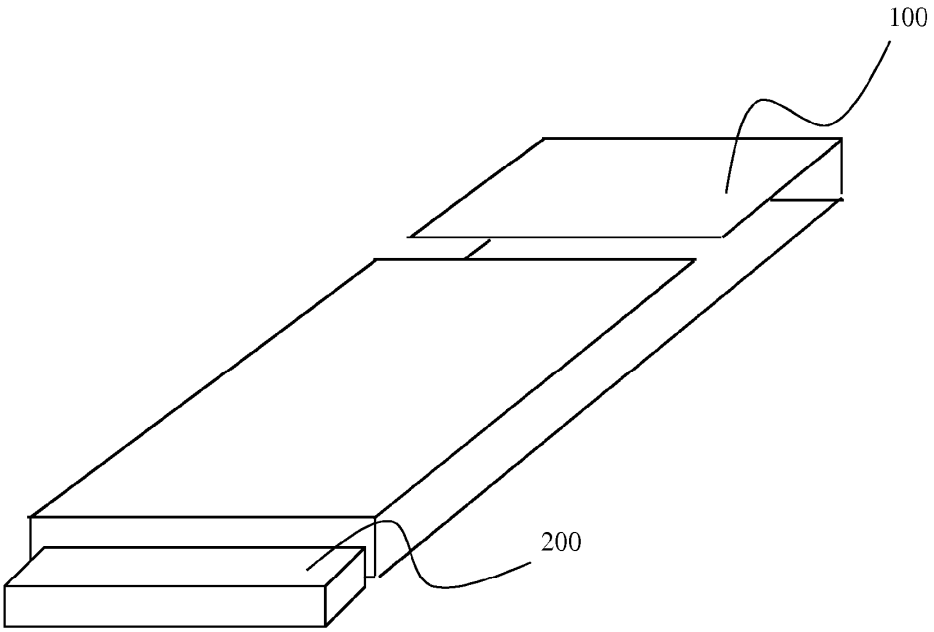
Publication Classification

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

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

(57) **ABSTRACT**

An exemplary embodiment includes an antenna arrangement for a portable radio communication device having a metal casing. The antenna arrangement generally includes a first antenna device and a second antenna device. The first antenna device comprises the metal casing and has a first radiating antenna pattern. The second antenna device has a second radiating antenna pattern. The second antenna device is outside the metal casing.



US 20120293385A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0293385 A1

(43) Pub. Date: Nov. 22, 2012

Liu et al.

(54) **ANTENNA DEVICE**

(76) Inventors: **Ruopeng Liu**, Shenzhen (CN); **Guanxiong Xu**, Shenzhen (CN); **Songtao Yang**, Shenzhen (CN); **Yuefeng Li**, Shenzhen (CN)

(21) Appl. No.: **13/522,022**

(22) PCT Filed: **Sep. 30, 2011**

(86) PCT No.: **PCT/CN2011/080496**

§ 371 (c)(1), (2), (4) Date: **Jul. 13, 2012**

(30) **Foreign Application Priority Data**

May 17, 2011 (CN) 201110127677.8

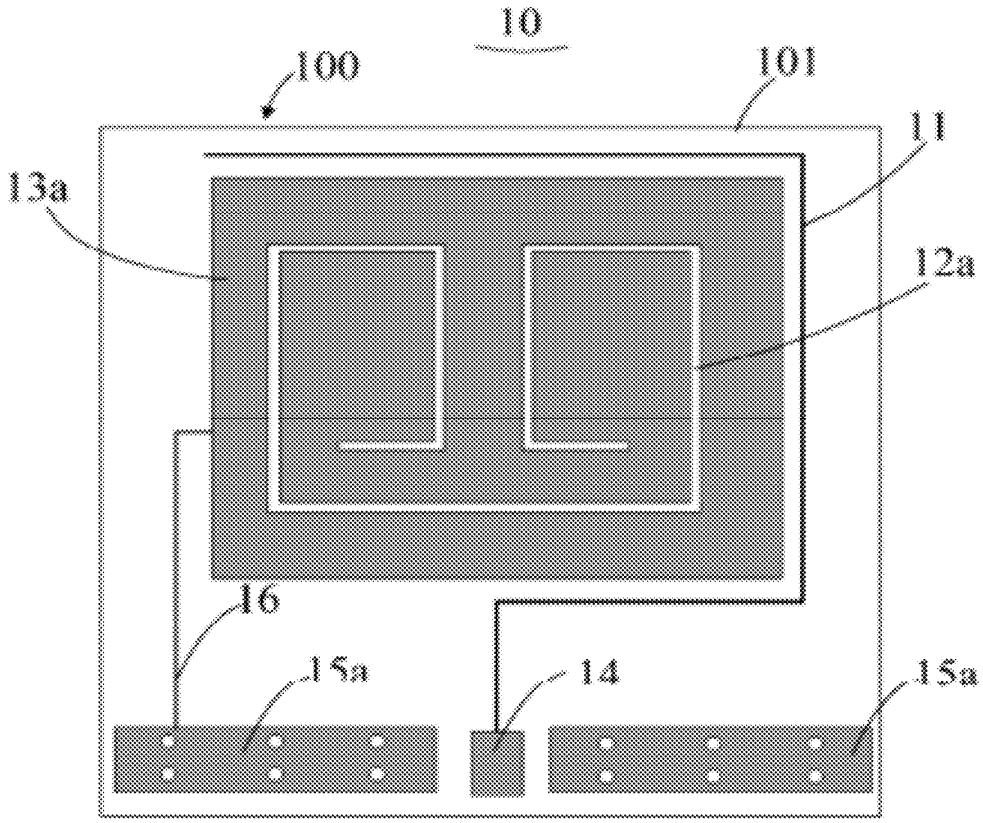
Publication Classification

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

(52) **U.S. Cl.** **343/787**; 343/835; 343/853

(57) **ABSTRACT**

The present disclosure discloses an antenna device, which comprises an array antenna and a power divider. The array antenna comprises a plurality of antenna units, and each of the antenna units comprises a conductive sheet engraved with a groove topology pattern, conductive feeding points and a feeder line. The power divider is adapted to divide a baseband signal into a plurality of weighted signals and then transmit the weighted signals to the antenna units arranged in an array via the conductive feeding points respectively. By arraying the antenna units and using the beam forming method, the directionality of the antenna can be designed as needed through phase superposition between the antenna units; and then, a reflective metal plate is provided on the back side of the antenna so that a back lobe of the antenna is compressed. In this way, the miniaturized antenna array can obtain a high directionality.



US 20120293387A1

(19) **United States**

(12) **Patent Application Publication**

Ohno

(10) **Pub. No.: US 2012/0293387 A1**

(43) **Pub. Date: Nov. 22, 2012**

(54) **ANTENNA APPARATUS PROVIDED WITH DIPOLE ANTENNA AND PARASITIC ELEMENT PAIRS AS ARRANGED AT INTERVALS**

(75) Inventor: **Takeshi Ohno**, Osaka (JP)

(73) Assignee: **Panasonic Corporation**, Osaka (JP)

(21) Appl. No.: **13/519,708**

(22) PCT Filed: **Oct. 21, 2011**

(86) PCT No.: **PCT/JP2011/005910**

§ 371 (c)(1),
(2), (4) Date: **Jun. 28, 2012**

(30) **Foreign Application Priority Data**

Oct. 22, 2010 (JP) 2010-236995

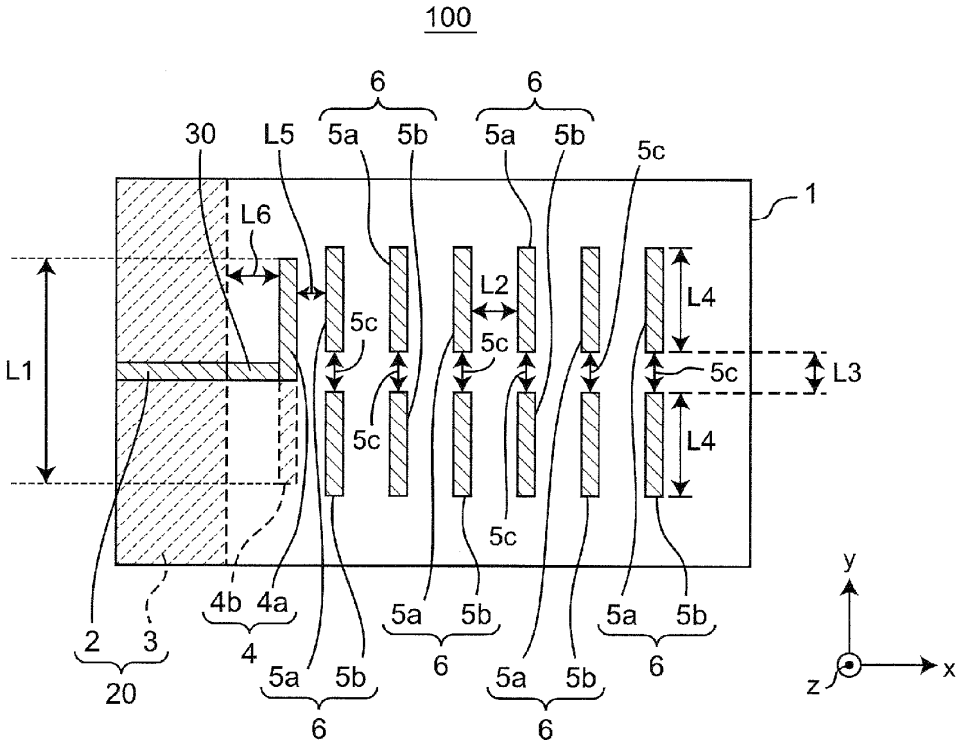
Publication Classification

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

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

(57) **ABSTRACT**

Parasitic elements of each parasitic element pair have a strip shape, and are formed on a straight line, which is parallel to a longitudinal direction of a printed dipole antenna and is positioned in a radiation direction of radio wave from the printed dipole antenna, so as to have a gap of a predetermined interval. The parasitic element pairs and the dipole antenna are arranged at predetermined intervals so as to oppose to and to be electromagnetically coupled to each other.



US 20120293389A1

(19) **United States**

(12) **Patent Application Publication**

QI et al.

(10) **Pub. No.: US 2012/0293389 A1**

(43) **Pub. Date: Nov. 22, 2012**

(54) **MOBILE WIRELESS COMMUNICATIONS DEVICE INCLUDING A GROUND PATCH PROVIDING SPECIFIC ABSORPTION RATE (SAR) REDUCTION AND RELATED METHODS**

(75) Inventors: **YIHONG QI**, WATERLOO (CA); **YING TONG MAN**, WATERLOO (CA); **PERRY JARMUSZEWSKI**, WATERLOO (CA)

(73) Assignee: **RESEARCH IN MOTION LIMITED**, WATERLOO (CA)

(21) Appl. No.: **13/567,736**

(22) Filed: **Aug. 6, 2012**

Related U.S. Application Data

(63) Continuation of application No. 13/206,552, filed on Aug. 10, 2011, now Pat. No. 8,253,635, which is a continuation of application No. 12/872,533, filed on Aug. 31, 2010, now Pat. No. 8,013,797, which is a continuation of application No. 12/472,638, filed on May 27, 2009, now Pat. No. 7,791,547, which is a continuation of application No. 11/733,360, filed on Apr. 10, 2007, now Pat. No. 7,554,496.

Publication Classification

(51) **Int. Cl.**

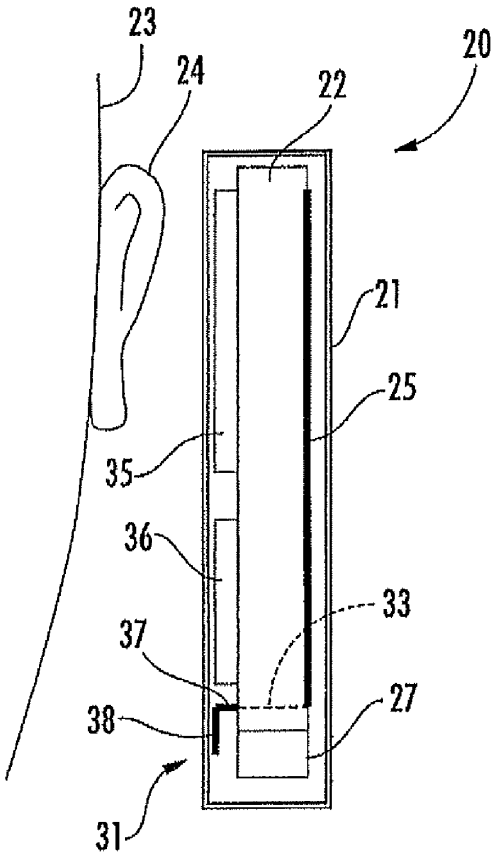
H01Q 1/48 (2006.01)

H05K 3/00 (2006.01)

(52) **U.S. Cl.** **343/848**; 29/829

(57) **ABSTRACT**

A mobile wireless communications device may include a portable housing, a dielectric substrate carried by the portable housing having a front side facing toward a user and a back side opposite the front side, and a ground plane carried by the dielectric substrate. The device may further include at least one circuit carried by the dielectric substrate, and an antenna carried by the dielectric substrate adjacent an end thereof and electrically connected to the at least one circuit. A ground patch may be adjacent the front side of the dielectric substrate that is electrically connected to the ground plane and spaced apart from and at least partially overlapping the antenna.



US 20120293392A1

(19) **United States**

(12) **Patent Application Publication**

Barratt et al.

(10) **Pub. No.: US 2012/0293392 A1**

(43) **Pub. Date: Nov. 22, 2012**

(54) **ANTENNA-IN-PACKAGE STRUCTURE**

(75) Inventors: **Christopher Barratt**, Valbonne (FR); **Chakib El Hassani**, Villeneuve Loubet (FR); **Pascal Ciais**, Antibes (FR)

(73) Assignee: **INSIGHT SIP SAS**, Grasse (FR)

(21) Appl. No.: **13/574,062**

(22) PCT Filed: **Jan. 19, 2011**

(86) PCT No.: **PCT/EP2011/050653**

§ 371 (c)(1),
(2), (4) Date: **Jul. 19, 2012**

(30) **Foreign Application Priority Data**

Jan. 20, 2010 (EP) 10305066.2

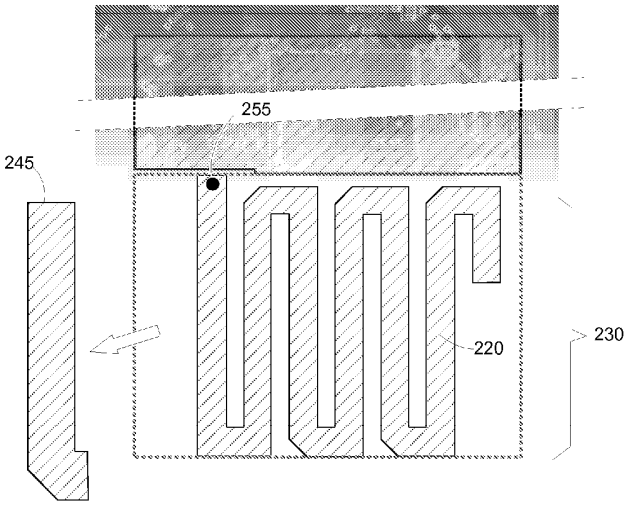
Publication Classification

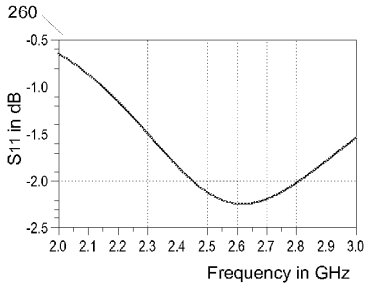
(51) **Int. Cl.**
H01Q 1/38 (2006.01)

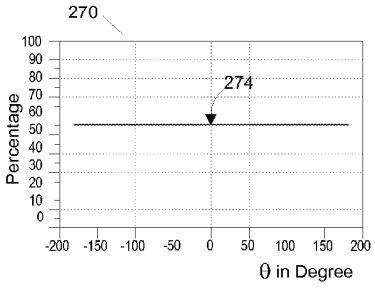
(52) **U.S. Cl.** **343/860**

(57) **ABSTRACT**

An electronic device with an antenna of the antenna-in-package type (AIP) includes an upper surface on which a radiating element is provided. The radiating element has an open end and a feeding end. The antenna also includes an adaptation element. The antenna is characterized in that the adaptation element is provided at an area that is different from the upper surface of the antenna holding the radiating element. The adaptation element is connected, at one end, to an intermediate point of the radiating element and grounded at another end. The device allows a further size reduction of standard inverted F antennas (IFA).







US 20120299778A1

(19) **United States**

(12) **Patent Application Publication**

YEN et al.

(10) **Pub. No.: US 2012/0299778 A1**

(43) **Pub. Date: Nov. 29, 2012**

(54) **ANTENNA USING THROUGH-SILICON VIA**

(75) Inventors: **Hsiao-Tsung YEN**, Tainan City (TW); **Jhe-Ching LU**, Tainan City (TW); **Yu-Ling LIN**, Taipei (TW); **Chin-Wei KUO**, Zhubei City (TW); **Min-Chie JENG**, Taipei (TW)

(73) Assignee: **TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY, LTD.**, Hsinchu (TW)

(21) Appl. No.: **13/114,828**

(22) Filed: **May 24, 2011**

Publication Classification

(51) **Int. Cl.**

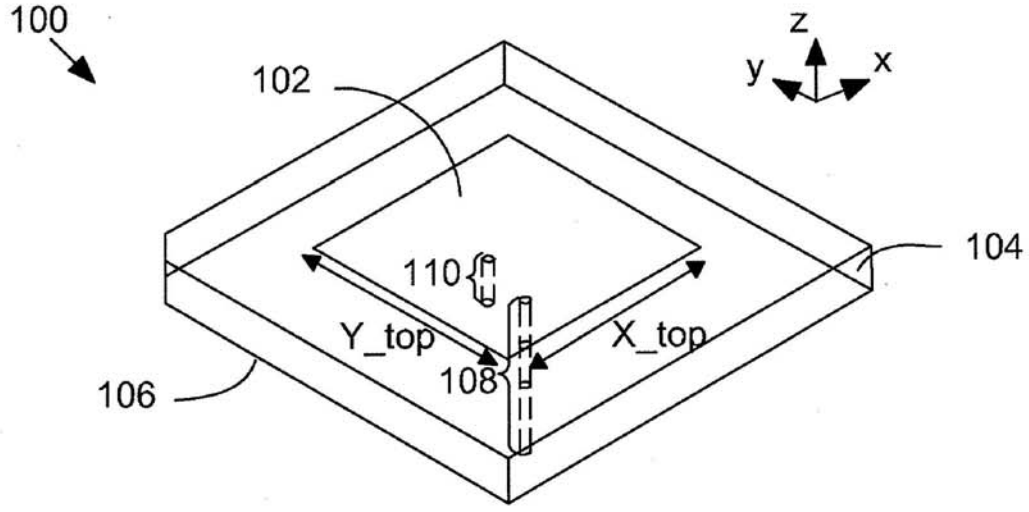
H01Q 1/38 (2006.01)

H01P 11/00 (2006.01)

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

(57) **ABSTRACT**

An antenna includes a substrate and a top plate disposed over the substrate. At least one feed line is connected to the top plate, and each feed line comprises a first through-silicon via (TSV) structure passing through the substrate. At least one ground line is connected to the top plate, and each ground line comprises a second TSV structure passing through the substrate. The top plate is electrically conductive, and the at least one feed line is arranged to carry a radio frequency signal. The at least one ground line is arranged to be coupled to a ground.



US 20120299779A1

(19) **United States**

(12) **Patent Application Publication**

Yen et al.

(10) **Pub. No.: US 2012/0299779 A1**

(43) **Pub. Date: Nov. 29, 2012**

(54) **ANTENNA WITH MULTIPLE RESONATING CONDITIONS**

(76) Inventors: **Li-Jean Yen**, Hsinchu (TW); **Chia-Tien Li**, Hsinchu (TW)

(21) Appl. No.: **13/196,878**

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

(30) **Foreign Application Priority Data**

May 27, 2011 (TW) 100118609

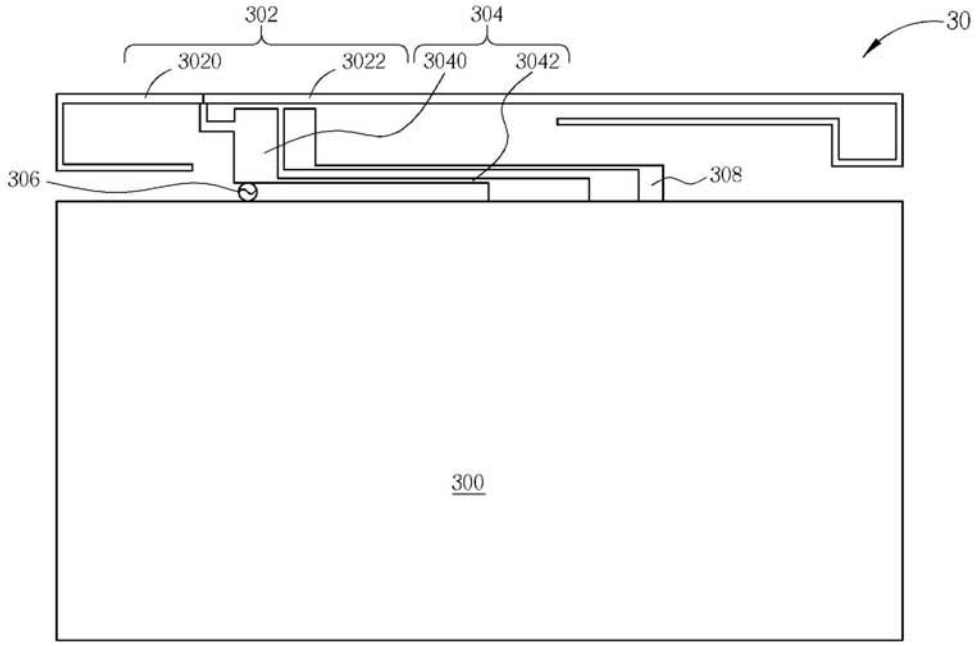
Publication Classification

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

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

(57) **ABSTRACT**

An antenna with multiple resonating conditions includes a grounding element electrically connected to a ground, a radiating element, a connection element electrically connected between the grounding element and the radiating element, a feed-in element electrically connected between the connection element and the grounding element for receiving feed-in signals, and a radiating-condition generating element electrically connected to the grounding element and extending from the grounding element to the radiating element.



US 20120299780A1

(19) **United States**

(12) **Patent Application Publication**

Hsieh et al.

(10) **Pub. No.: US 2012/0299780 A1**

(43) **Pub. Date: Nov. 29, 2012**

(54) **WIDEBAND ANTENNA**

(76) Inventors: **Chih-Sen Hsieh**, Hsinchu (TW); **Jen-Min Shau**, Hsinchu (TW); **Hsiao-Yi Lin**, Hsinchu (TW)

(21) Appl. No.: **13/210,378**

(22) Filed: **Aug. 16, 2011**

(30) **Foreign Application Priority Data**

May 25, 2011 (TW) 100118328

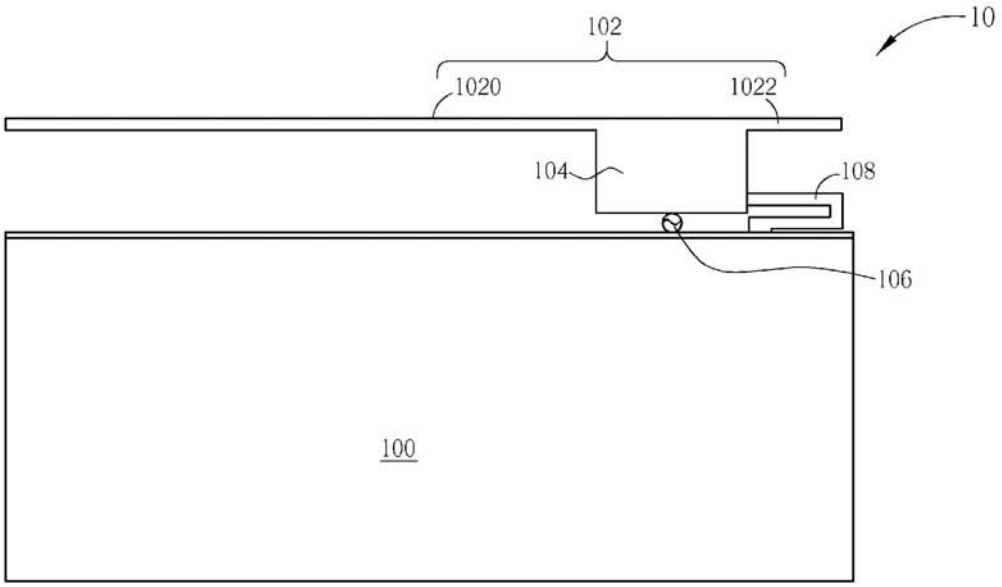
Publication Classification

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

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

(57) **ABSTRACT**

A wideband antenna includes a grounding element electrically connected to a ground, a radiating element, a matching adjustment element electrically connected to the radiating element, a feed-in element electrically connected between the matching adjustment element and the grounding element for receiving feed-in signals, and a shorting element electrically connected between the matching adjustment element and the grounding element. A width of the matching adjustment element is related to a bandwidth of the wideband antenna.



US 20120299781A1

(19) **United States**

(12) **Patent Application Publication**

LEE

(10) **Pub. No.: US 2012/0299781 A1**

(43) **Pub. Date: Nov. 29, 2012**

(54) **ANTENNA FOR A PORTABLE COMPUTER**

(75) Inventor: **SUNGGYOO LEE**, MACHIDA-SHI (JP)

(73) Assignee: **LENOVO (SINGAPORE) PTE. LTD.**, SINGAPORE (SG)

(21) Appl. No.: **13/468,452**

(22) Filed: **May 10, 2012**

(30) **Foreign Application Priority Data**

May 24, 2011 (JP) 2011-116272

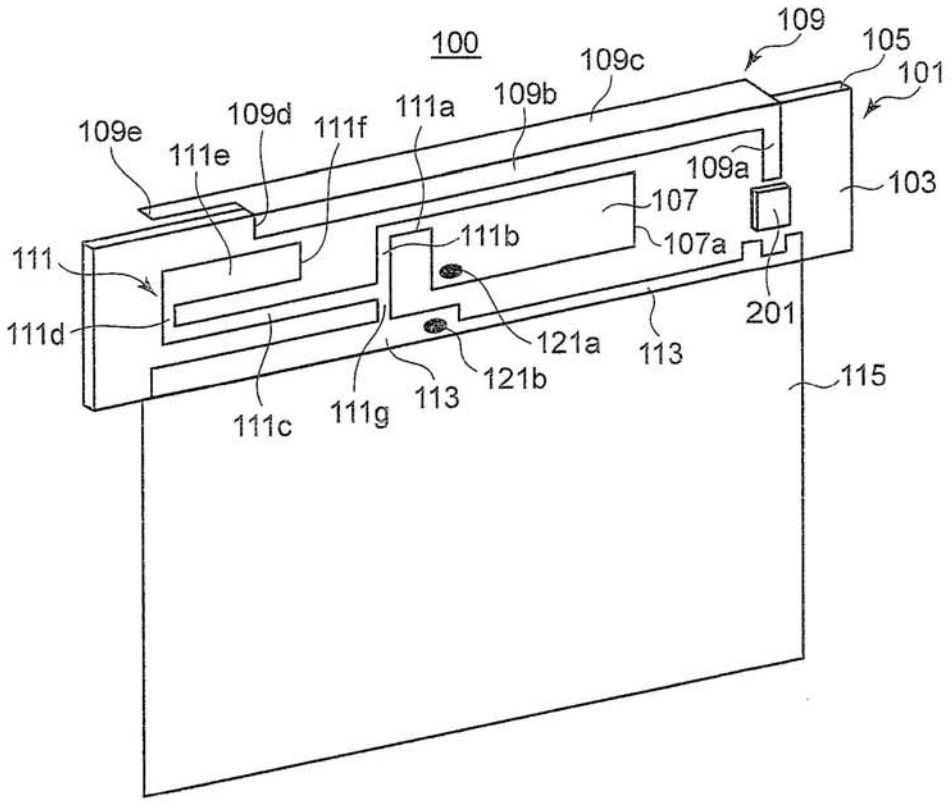
Publication Classification

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

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

(57) **ABSTRACT**

An antenna for a portable computer is disclosed. The antenna includes a ground element, a first and second radiating elements, and a driven element. The ground element is linearly extended on a surface of a circuit substrate. The first radiating element, which is adapted to a first frequency band, includes a horizontal-portion pattern extending substantially parallel to the ground element on the surface of the circuit substrate. The driven element, which is provided on the surface of the circuit substrate between the ground element and the horizontal-portion pattern, supplies electromagnetic-wave energy to the first radiating element. The second radiating element is provided on the surface of the circuit substrate between the ground element and the horizontal-portion pattern. The second radiating has contact with the driven element, and is adapted to a second frequency band and a third frequency band that is higher than the second frequency band.



US 20120299782A1

(19) **United States**

(12) **Patent Application Publication**

CHOU

(10) **Pub. No.: US 2012/0299782 A1**

(43) **Pub. Date: Nov. 29, 2012**

(54) **MINIATURE ANTENNA**

(76) Inventor: **Chih-Shen CHOU**, Miaoli County (TW)

(21) Appl. No.: **13/481,641**

(22) Filed: **May 25, 2012**

(30) **Foreign Application Priority Data**

May 27, 2011 (TW) 100209516

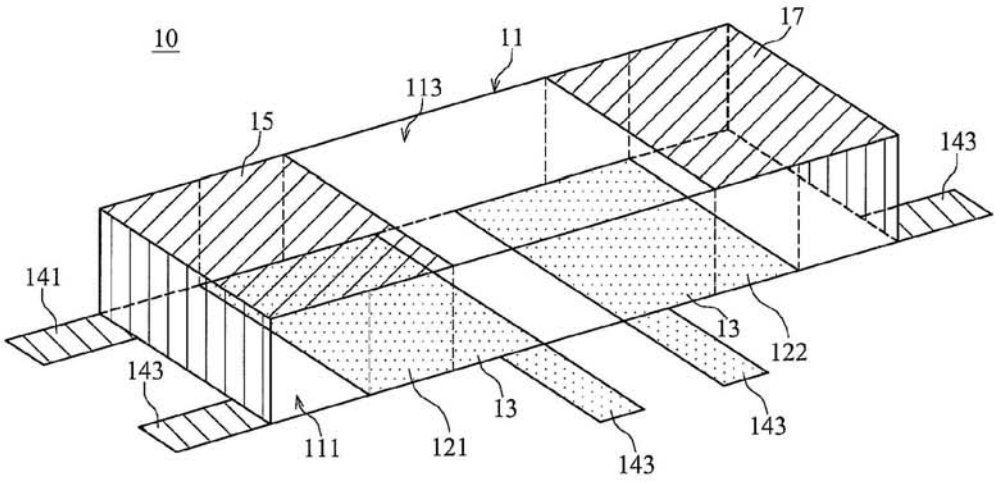
Publication Classification

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

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

(57) **ABSTRACT**

The present invention is related to a miniature antenna, mainly comprising a dielectric element, at least one first conductive plane, a second conductive plane, a third conductive plane, a plurality of ground terminals, and a signal feeding terminal. A part of the first conductive plane overlaps a part of the second conductive plane to form a first overlap region. A part of the first conductive plane also overlaps a part of the third conductive plane to form a second overlap region. Two resonant frequencies thus can be provided for the miniature antenna. By adjusting the sizes of overlap regions, the distances between the conductive planes, or dielectric constant of the dielectric element, the bandwidths of the two resonant frequencies may be produced to overlap each other to form a miniature antenna having a wider bandwidth.



US 20120299783A1

(19) **United States**

(12) **Patent Application Publication**

LEE et al.

(10) **Pub. No.: US 2012/0299783 A1**

(43) **Pub. Date: Nov. 29, 2012**

(54) **ANTENNA STRUCTURE**

(75) Inventors: **Young-ju LEE**, Seoul (KR); **Byung-chul KIM**, Hwaseong-si (KR); **Jung-min PARK**, Seoul (KR)

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

(21) Appl. No.: **13/482,453**

(22) Filed: **May 29, 2012**

Related U.S. Application Data

(60) Provisional application No. 61/490,715, filed on May 27, 2011.

(30) **Foreign Application Priority Data**

Oct. 31, 2011 (KR) 10-2011-0112501

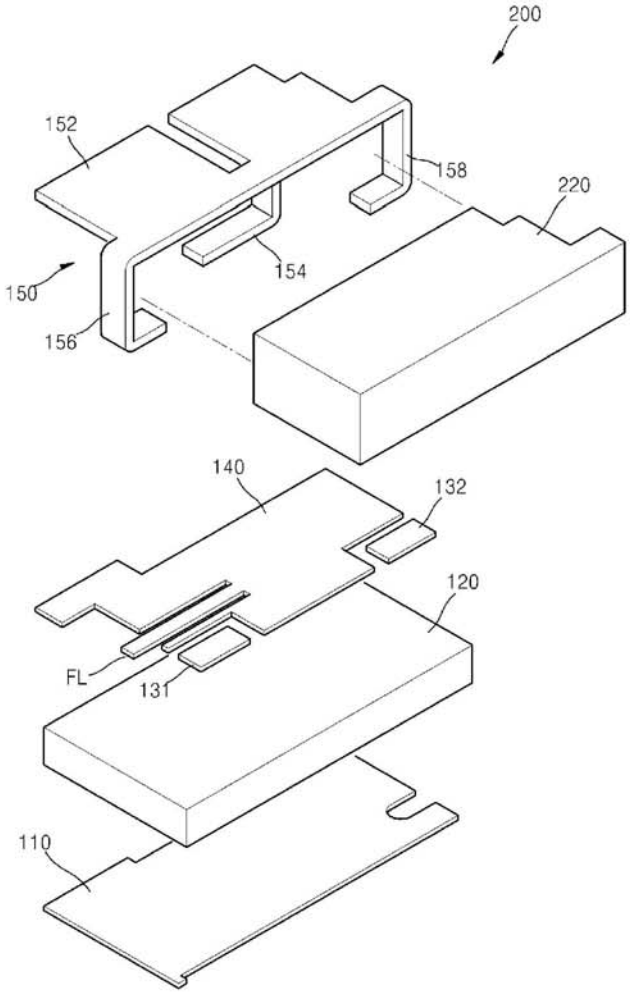
Publication Classification

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

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

(57) **ABSTRACT**

An antenna structure includes: a substrate; a ground layer disposed on a first surface of the substrate; a patch antenna unit which is disposed on a second surface of the substrate opposite to the first surface of the substrate, and is configured to receive a signal to be radiated; and a three-dimensional (3D) antenna unit which comprises a shorting leg that is shorted with the patch antenna unit, and is configured to radiate the signal received by the patch antenna unit.



US 20120299784A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2012/0299784 A1**

(43) **Pub. Date: Nov. 29, 2012**

Ayatollahi

(54) **MOBILE WIRELESS COMMUNICATIONS DEVICE INCLUDING AN ANTENNA HAVING A SHORTING PLATE**

(75) Inventor: **Mina Ayatollahi**, Waterloo (CA)

(73) Assignees: **Ontario, Canada)**, Waterloo (CA); **Research In Motion Limited (a corporation organized under the laws of the Province of**

(21) Appl. No.: **13/114,532**

(22) Filed: **May 24, 2011**

Publication Classification

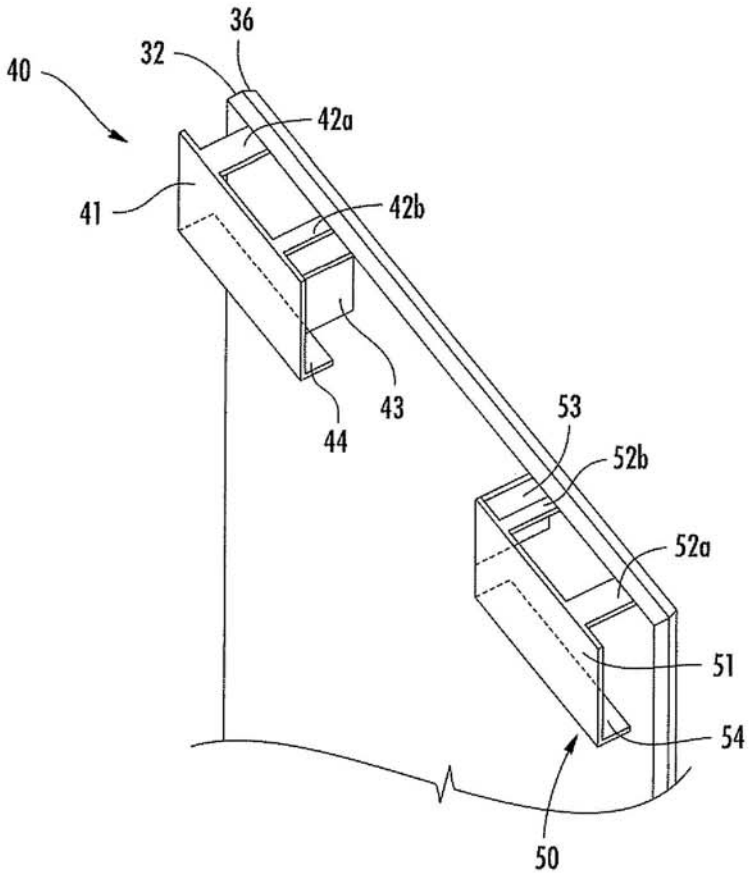
(51) **Int. Cl.**

H01Q 1/24	(2006.01)
H05K 13/00	(2006.01)
H01P 11/00	(2006.01)

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

(57) **ABSTRACT**

A mobile wireless communications device may include a housing, a substrate carried by the housing, and a ground plane adjacent the substrate. The mobile wireless communications device may also include wireless communications circuitry, and first and second antennas coupled to the wireless communications circuitry. The first antenna may include a base electrical conductor spaced above the substrate, and at least one feed leg extending downwardly from the base electrical conductor to the substrate. The first antenna may also include an electrically conductive shorting plate extending downwardly from the base electrical conductor from a portion thereof adjacent the second antenna and coupled to the ground plane.



US 20120299785A1

(19) **United States**

(12) **Patent Application Publication**

Bevelacqua

(10) **Pub. No.: US 2012/0299785 A1**

(43) **Pub. Date: Nov. 29, 2012**

(54) **DYNAMICALLY ADJUSTABLE ANTENNA SUPPORTING MULTIPLE ANTENNA MODES**

(76) Inventor: **Peter Bevelacqua**, Cupertino, CA (US)

(21) Appl. No.: **13/118,276**

(22) Filed: **May 27, 2011**

Publication Classification

(51) **Int. Cl.**

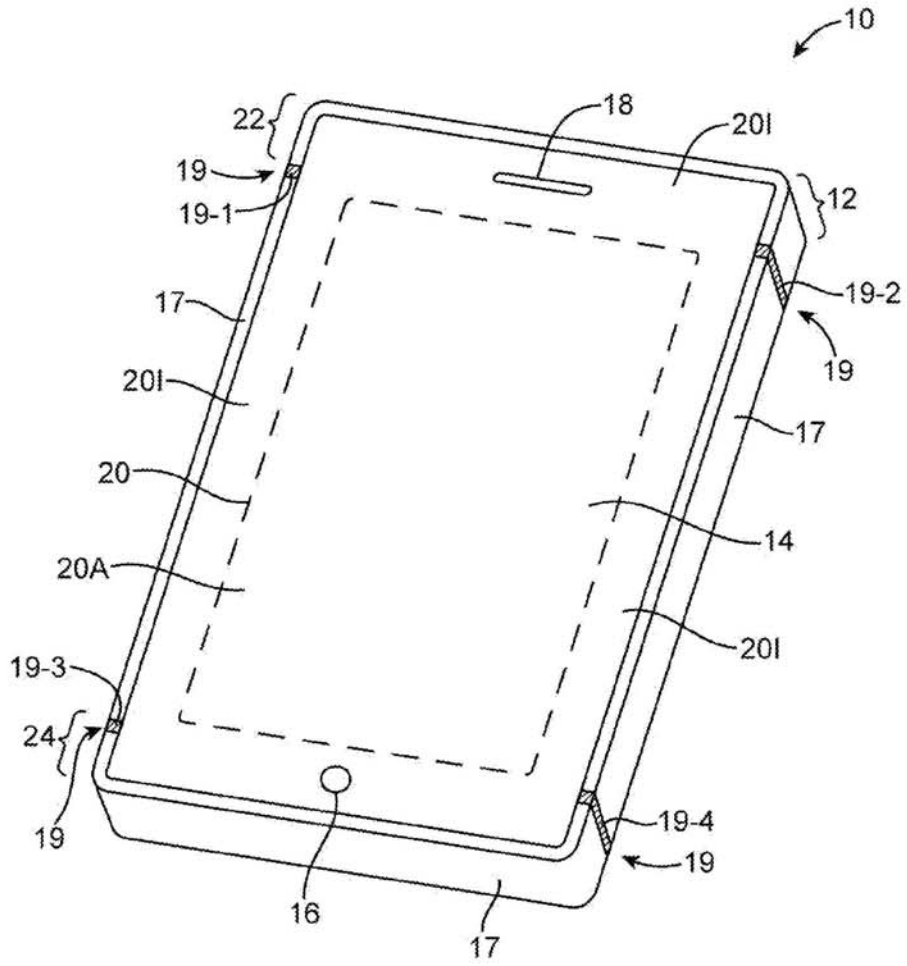
H01Q 21/30 (2006.01)

H01Q 1/24 (2006.01)

(52) **U.S. Cl.** **343/702**; 343/725

(57) **ABSTRACT**

Electronic devices may be provided that contain wireless communications circuitry. The wireless communications circuitry may include radio-frequency transceiver circuitry coupled to an adjustable antenna. The adjustable antenna may contain conductive antenna structure such as conductive electronic device housing structures. Electrical components such as switches and resonant circuits may be used in configuring the antenna to operate in two or more different antenna modes at different respective communications bands. Control circuitry may be used in controlling the switches. The antenna may be configured to operate as an inverted-F antenna in one mode of operation and a slot antenna in a second mode of operation.



US 20120299790A1

(19) **United States**

(12) **Patent Application Publication**

Bounpraseuth

(10) **Pub. No.: US 2012/0299790 A1**

(43) **Pub. Date: Nov. 29, 2012**

(54) **FOLDED-DIPOLE FLAT-PLATE ANTENNA**

(76) Inventor: **Khamprasith Bounpraseuth**, Maisons Alfort (FR)

(21) Appl. No.: **13/576,244**

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

(86) PCT No.: **PCT/FR2011/000071**

§ 371 (c)(1),
(2), (4) Date: **Jul. 31, 2012**

(30) **Foreign Application Priority Data**

Feb. 5, 2010 (FR) 1000472

Publication Classification

(51) **Int. Cl.**
H01Q 9/26 (2006.01)
H01Q 19/10 (2006.01)
H01Q 9/28 (2006.01)

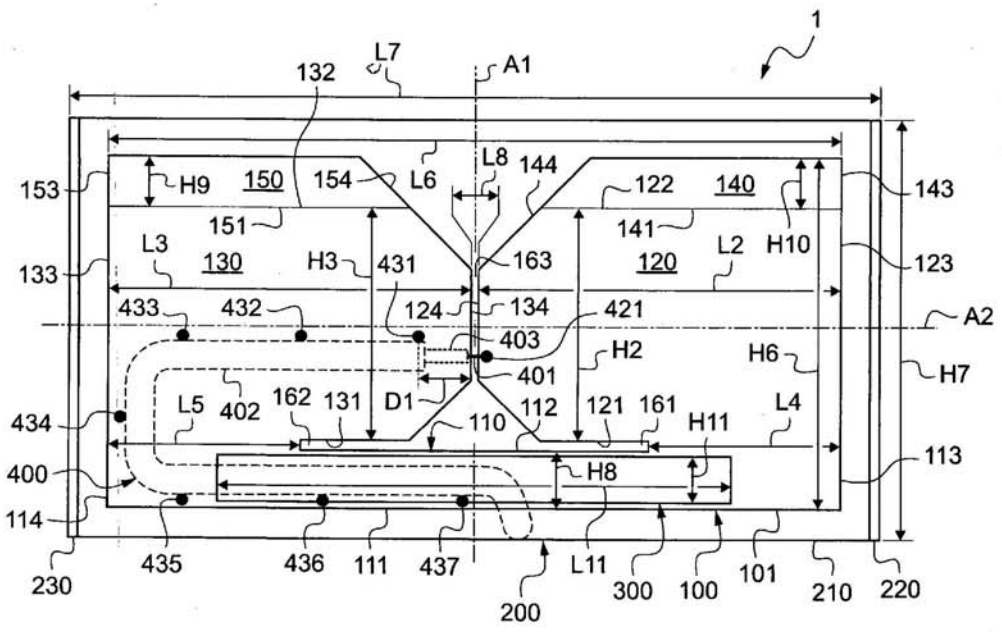
(52) **U.S. Cl.** **343/795**

(57) **ABSTRACT**

The antenna (**1**) includes:

a flat radiating plate (**100**) having three slots formed therein in a T-shaped configuration, with first and second ones of those slots (**161**, **162**) forming the base of the T-shape and with a third one of those slots forming the leg of the T-shape, the third slot (**163**) being the only slot to open out into the peripheral edge (**101**) of the radiating plate, the three slots defining two wings (**120**, **130**) situated on either side of the third slot; and

an electrical cable including a first electrical conductor connected to a first one of the wings and a second electrical conductor is connected to a second one of the wings.



US 20120299792A1

(19) **United States**

(12) **Patent Application Publication**

Montgomery et al.

(10) **Pub. No.: US 2012/0299792 A1**

(43) **Pub. Date: Nov. 29, 2012**

(54) **MULTIMODE ANTENNA STRUCTURE**

(75) Inventors: **Mark T. Montgomery**, Melbourne Beach, FL (US); **Frank M. Caimi**, Vero Beach, FL (US); **Mark W. Kishler**, Rockledge, FL (US)

(73) Assignee: **SKYCROSS, INC.**, Viera, FL (US)

(21) Appl. No.: **13/454,738**

(22) Filed: **Apr. 24, 2012**

Related U.S. Application Data

(63) Continuation of application No. 12/750,196, filed on Mar. 30, 2010, now Pat. No. 8,164,538, which is a continuation of application No. 12/099,320, filed on Apr. 8, 2008, now Pat. No. 7,688,273, which is a continuation-in-part of application No. 11/769,565, filed on Jun. 27, 2007, now Pat. No. 7,688,275.

(60) Provisional application No. 60/925,394, filed on Apr. 20, 2007, provisional application No. 60/916,655, filed on May 8, 2007.

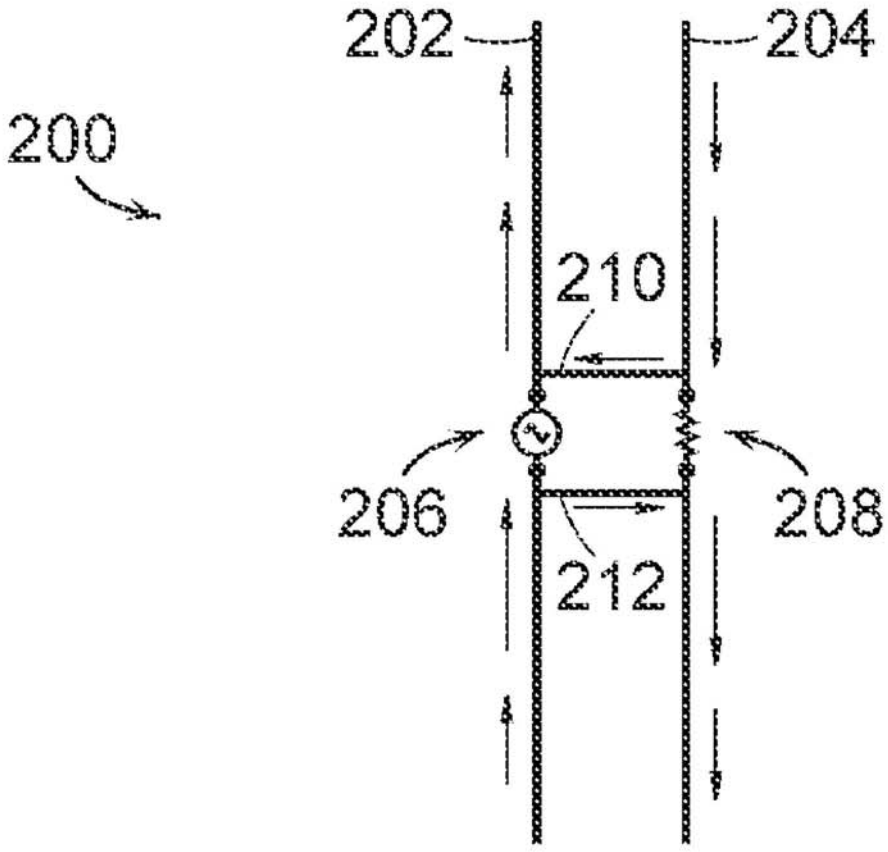
Publication Classification

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

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

(57) **ABSTRACT**

A multimode antenna structure transmits and receives electromagnetic signals in a communications device.



US 20120299795A1

(19) **United States**

(12) **Patent Application Publication**

Wang

(10) **Pub. No.: US 2012/0299795 A1**

(43) **Pub. Date: Nov. 29, 2012**

(54) **MINIATURIZED ULTRA-WIDEBAND MULTIFUNCTION ANTENNA VIA MULTI-MODE TRAVELING-WAVES (TW)**

(75) Inventor: **Johnson J. H. Wang**, Marietta, GA (US)

(73) Assignee: **WANG ELECTRO-OPTO CORPORATION**, Marietta, GA (US)

(21) Appl. No.: **13/449,066**

(22) Filed: **Apr. 17, 2012**

Related U.S. Application Data

(60) Provisional application No. 61/490,240, filed on May 26, 2011.

Publication Classification

(51) **Int. Cl.**

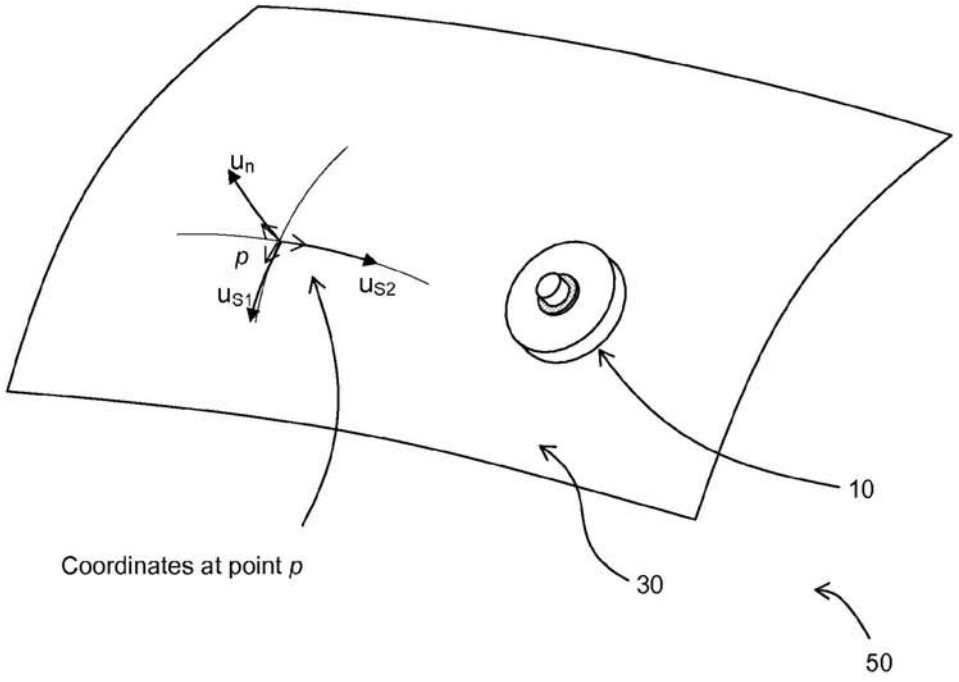
H01Q 1/50 (2006.01)

H01Q 25/04 (2006.01)

(52) **U.S. Cl.** **343/850**; 343/893

(57) **ABSTRACT**

A miniaturized ultra-wideband multifunction antenna comprising a conducting ground plane at the base, a plurality of concentric feed cables, one or more omnidirectional one-dimensional (1-D) normal-mode and two-dimensional (2-D) surface-mode traveling-wave (TW) radiators, frequency-selective internal and external couplers, and a unidirectional radiator on top, stacked and cascaded one on top of the other. Configured as a single structure, its unidirectional radiator and plurality of omnidirectional TW radiators can cover, respectively, most satellite and terrestrial communications, with unidirectional and omnidirectional radiation patterns, respectively, needed on various platforms. This new class of multifunction antenna is ultra-wideband, miniaturized and low-cost, thus attractive for applications on automobiles and other small platforms. As a multifunction antenna, a continuous bandwidth up to 1000:1 or more is reachable for terrestrial communications and a continuous bandwidth of 10:1 or more is feasible for satellite communications.



US 20120299841A1

(19) **United States**

(12) **Patent Application Publication**

TANG et al.

(10) **Pub. No.: US 2012/0299841 A1**

(43) **Pub. Date: Nov. 29, 2012**

(54) **TOUCH STRUCTURE AND TOUCH PANEL HAVING AN ANTENNA FUNCTION**

(75) Inventors: **CHIA-LUN TANG**, MIAOLI COUNTY (TW); **YU-PIN CHANG**, TAOYUAN COUNTY (TW)

(73) Assignee: **AUDEN TECHNO CORP.**, TAOYUAN COUNTY (TW)

(21) Appl. No.: **13/118,354**

(22) Filed: **May 27, 2011**

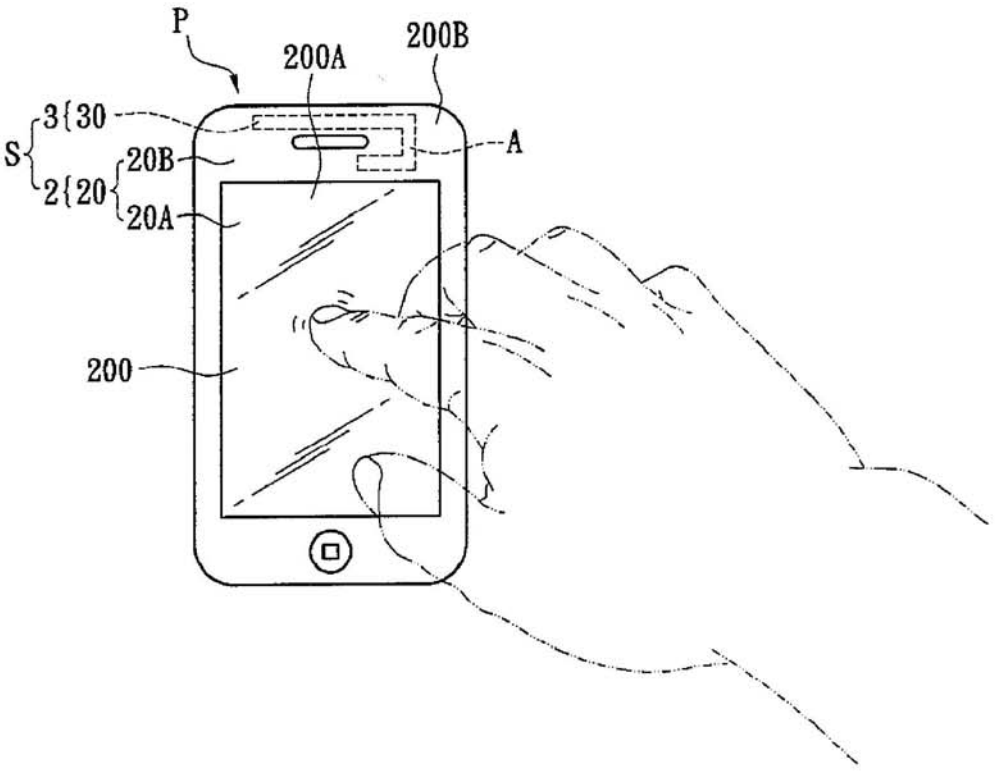
Publication Classification

(51) **Int. Cl.**
G06F 3/041 (2006.01)

(52) **U.S. Cl.** **345/173**; 178/18.03

(57) **ABSTRACT**

A touch structure having an antenna function includes a substrate unit and an antenna unit. The substrate unit has a touch surface on the top surface thereof for an external object to touch in order to operate a touch-controlled module. The substrate unit includes at least one transparent substrate having at least one transparent portion and at least one nontransparent portion disposed around the transparent portion and combined with the transparent portion, the transparent portion has an image-viewing area on the top surface thereof, and the nontransparent portion has a non-image-viewing area on the top surface thereof. The antenna unit includes at least one antenna radiation structure disposed on the transparent substrate or embedded in the transparent substrate, and the layout of the antenna radiation structure shows an antenna radiation pattern having a predetermined operation band.



US 20120300682A1

(19) **United States**

(12) **Patent Application Publication**

Hartenstein

(10) **Pub. No.: US 2012/0300682 A1**

(43) **Pub. Date: Nov. 29, 2012**

(54) **MIMO ANTENNA SYSTEM HAVING BEAMFORMING NETWORKS**

(75) Inventor: **Abraham Hartenstein**, Chatsworth, CA (US)

(73) Assignee: **Xirrus, Inc.**, Thousand Oaks, CA (US)

(21) Appl. No.: **13/115,091**

(22) Filed: **May 24, 2011**

Publication Classification

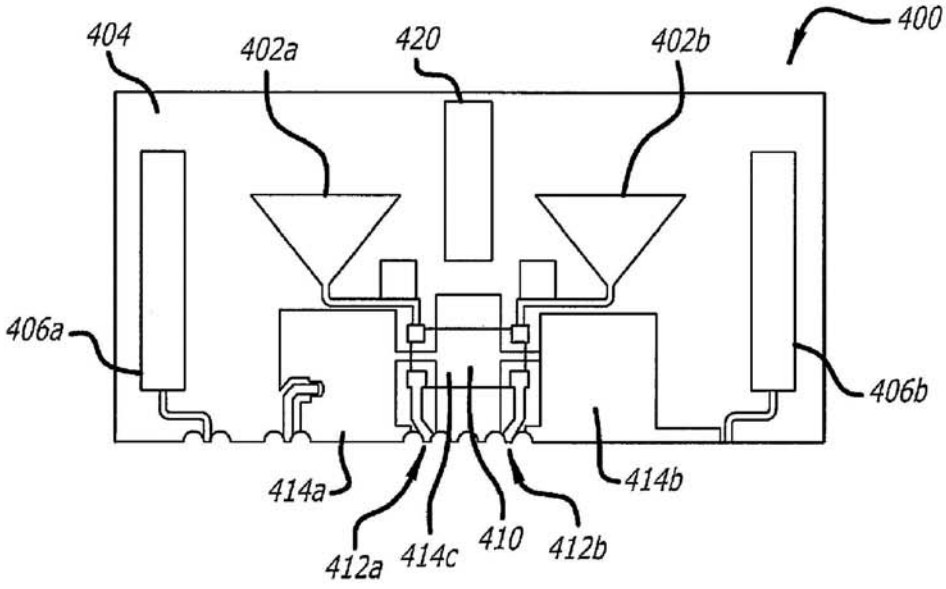
(51) **Int. Cl.**

H04W 84/12	(2009.01)
H04W 4/00	(2009.01)
H04W 16/00	(2009.01)

(52) **U.S. Cl.** **370/297**; 370/328; 370/338

(57) **ABSTRACT**

An antenna system connected to a radio in a Multiple-Input, Multiple-Output (MIMO) arrangement and configured to communicate in an area of coverage. The antenna system includes a plurality of antenna elements. The plurality of antenna elements further includes a first plurality of antenna elements configured to communicate on a first frequency band and a second plurality of antenna elements configured to communicate on a second frequency band. A plurality of MIMO-configured radio ports on the radio communicates radio signals to and from the antenna elements. A beam-forming network is connected to at least two of the first plurality of antenna elements and to at least two radio ports. The beam-forming network is configured to form space diversity beams in the area of coverage.



US 20120302298A1

(19) **United States**

(12) **Patent Application Publication**

Ayatollahi

(10) **Pub. No.: US 2012/0302298 A1**

(43) **Pub. Date: Nov. 29, 2012**

(54) **MOBILE WIRELESS COMMUNICATIONS DEVICE HAVING AN ANTENNA ASSEMBLY WITH CORNER COUPLED RECTANGULAR BASE CONDUCTOR PORTIONS AND RELATED METHODS**

(75) Inventor: **Mina Ayatollahi**, Waterloo (CA)

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

(21) Appl. No.: **13/114,476**

(22) Filed: **May 24, 2011**

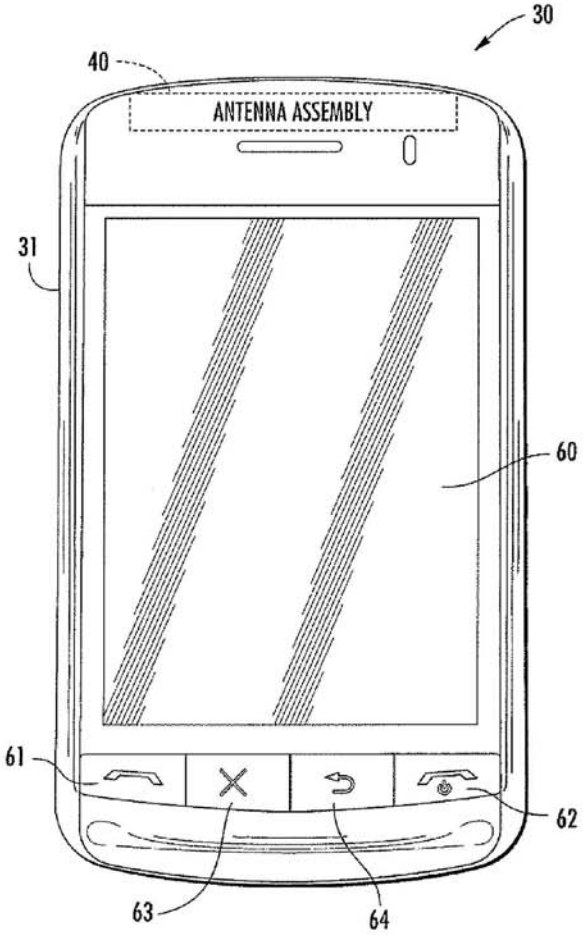
Publication Classification

(51) **Int. Cl.**
H04W 88/02 (2009.01)

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

(57) **ABSTRACT**

A mobile wireless communications device may include a portable housing, a substrate carried by the portable housing, and wireless communications circuitry carried by the substrate. The mobile wireless communications device may also include at least one an antenna assembly carried by the substrate and coupled to the wireless communications circuitry. The at least one antenna assembly may include an electrically conductive base conductor having a first rectangular base portion and a second rectangular base portion offset therefrom. The first and second base portions may be coupled at respective diagonally opposing corners thereof and having an antenna feed defined along an outer portion of one of the first and second rectangular base portions. The at least one antenna assembly may include at least one electrically conductive arm extending along at least one side of one of the first and second rectangular base portions and spaced apart therefrom.



US 20120306700A1

(19) **United States**

(12) **Patent Application Publication**

Ridgeway

(10) **Pub. No.: US 2012/0306700 A1**

(43) **Pub. Date: Dec. 6, 2012**

(54) **SURFACE MOUNT MODULE EMBEDDED ANTENNA**

(76) Inventor: **Robert Wayne Ridgeway**, Saratoga Springs, UT (US)

(21) Appl. No.: **13/151,739**

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

Publication Classification

(51) **Int. Cl.**

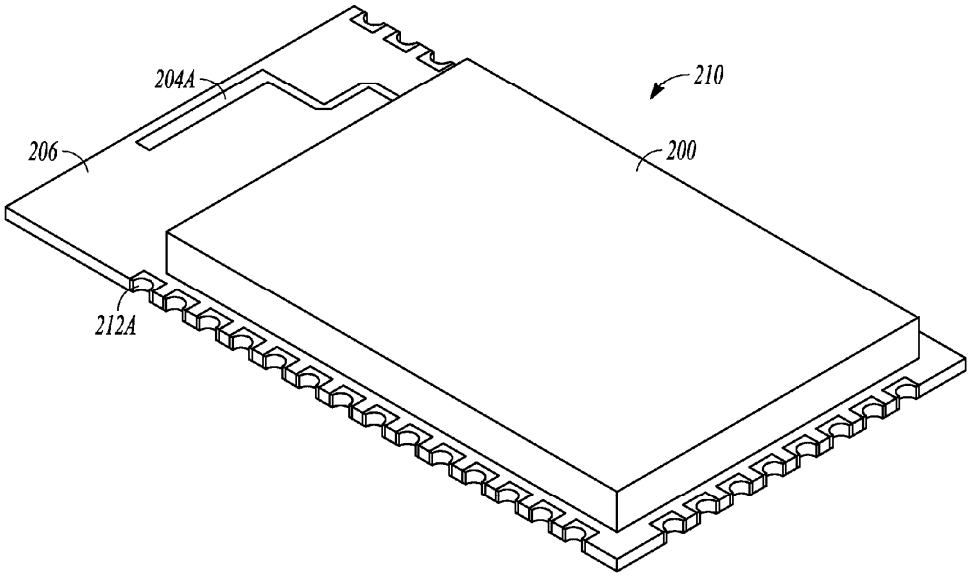
H01Q 1/38 (2006.01)

H01P 11/00 (2006.01)

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

(57) **ABSTRACT**

An apparatus includes a dielectric sheet, and an antenna structure. The antenna structure comprises a first conductive portion located on an exterior surface of the dielectric sheet and a second conductive portion buried in the dielectric sheet and configured for coupling to a return portion of the wireless communication circuit. The second conductive portion includes a plane area adjacent to the first conductive portion in a region proximal to the feed portion and separated from the first conductive portion by a portion of the dielectric sheet, a curved transition portion, the transition portion including a lateral width that tapers along the length of the second conductive portion, and a distal portion comprising two parallel conductive strips, the distal portion electrically coupled to the plane area via the curved transition portion, wherein the parallel conductive strips are thinner in lateral width than the plane area.



US 20120306702A1

(19) **United States**

(12) **Patent Application Publication**

Kaneko et al.

(10) **Pub. No.: US 2012/0306702 A1**

(43) **Pub. Date: Dec. 6, 2012**

(54) **SUBSTRATE ANTENNA**

(75) Inventors: **Tutomu Kaneko**, Tokyo (JP); **Takahisa Karakama**, Nakano-shi (JP)

(73) Assignees: **Faverights, Inc.**, Nakano-shi (JP); **NISSEI Limited**, Tokyo (JP)

(21) Appl. No.: **13/483,557**

(22) Filed: **May 30, 2012**

(30) **Foreign Application Priority Data**

May 31, 2011 (JP) 2011-122344

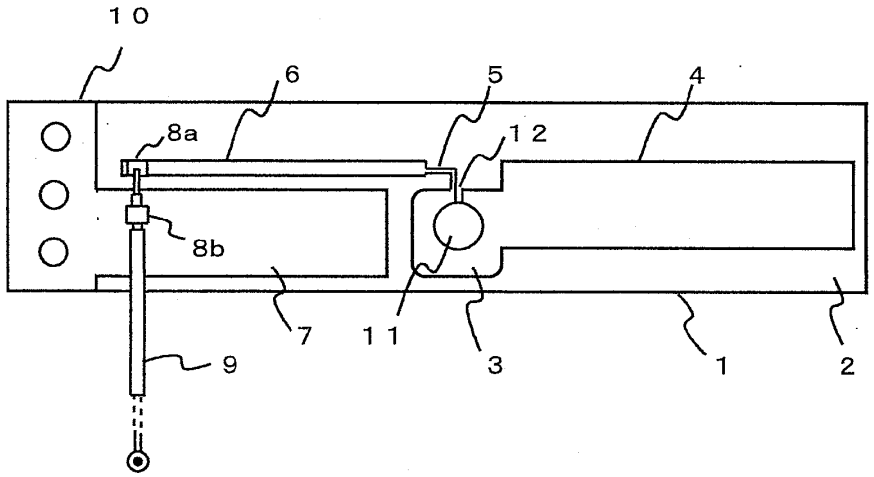
Publication Classification

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

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

(57) **ABSTRACT**

The simply configured substrate antenna has a plurality of antennas. A loop-like first joint pattern one spot of which is divided is formed in one-side substrate surface of a substrate composed of a dielectric material. Antenna elements that configure a first antenna are respectively connected to both ends of the first joint pattern at the divided position. A loop-like second joint pattern one spot of which is divided is formed in the other-side substrate surface at a position opposite to the first joint pattern. Antenna elements that configure a second antenna are respectively connected to both ends of the second joint pattern at the divided position. The first and second antennas are set to approximately the same or different resonance frequency bands. Feeding and ground points connected to and formed in the first joint pattern are held in common to transmit or receive a transmission/reception signal.



US 20120306703A1

(19) **United States**

(12) **Patent Application Publication**

KOMAKI et al.

(10) **Pub. No.: US 2012/0306703 A1**

(43) **Pub. Date: Dec. 6, 2012**

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

(75) Inventors: **Kunihiro KOMAKI**, Kyoto-fu (JP); **Masayuki ATOKAWA**, Kyoto-fu (JP); **Masahiro IZAWA**, Kyoto-fu (JP); **Yuji KAMINISHI**, Kyoto-fu (JP); **Tsuyoshi MUKAI**, Kyoto-fu (JP)

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

(21) Appl. No.: **13/584,601**

(22) Filed: **Aug. 13, 2012**

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2010/068887, filed on Oct. 26, 2010.

(30) **Foreign Application Priority Data**

Feb. 16, 2010 (JP) 2010-031249

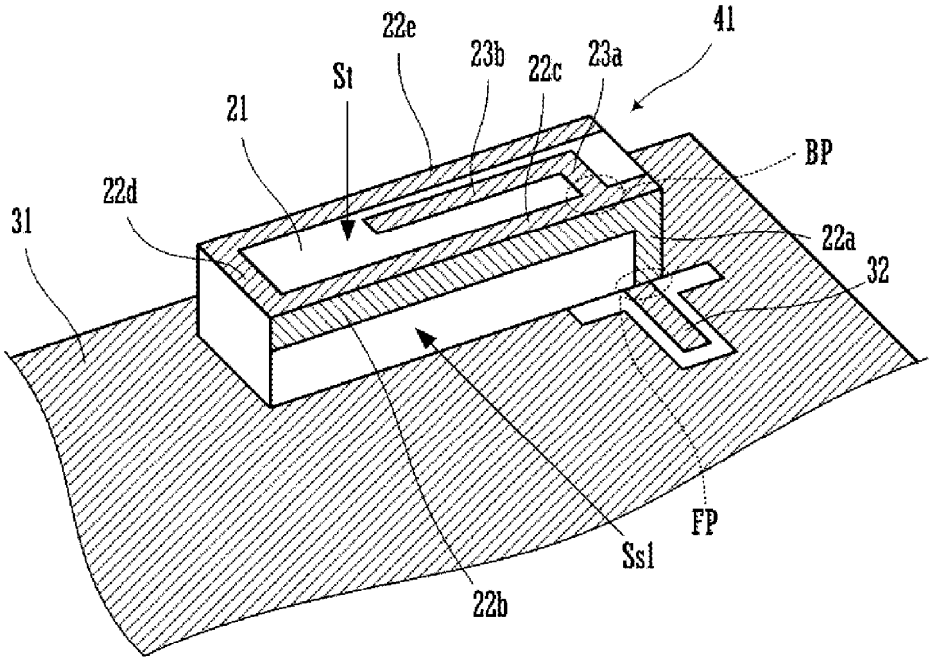
Publication Classification

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

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

(57) **ABSTRACT**

This disclosure provides an antenna and a wireless communication device that includes the antenna in which a high-order mode can be controlled while maintaining good radiation characteristics in both the fundamental mode and high-order mode. The antenna has a radiation electrode provided on a surface of a dielectric substrate and a branch electrode portion that branches from the radiation electrode portion at a branch point near the feeding port toward a vicinity of a position of the radiation electrode at which a maximum voltage of a high-order mode is generated.



US 20120306704A1

(19) **United States**

(12) **Patent Application Publication**

LI et al.

(10) **Pub. No.: US 2012/0306704 A1**

(43) **Pub. Date: Dec. 6, 2012**

(54) **ANTENNA MOUNTING STRUCTURE OF ELECTRONIC DEVICE**

(75) Inventors: **HONG LI**, Shenzhen City (CN); **KE-HUI PENG**, Shenzhen City (CN); **LI-NI LIANG**, Shenzhen City (CN); **REN-WEN WANG**, Shenzhen City (CN)

(73) Assignees: **HON HAI PRECISION INDUSTRY CO., LTD.**, Tu-Cheng (TW); **HONG FU JIN PRECISION INDUSTRY (ShenZhen) CO., LTD.**, Shenzhen City (CN)

(21) Appl. No.: **13/220,814**

(22) Filed: **Aug. 30, 2011**

(30) **Foreign Application Priority Data**

Jun. 1, 2011 (CN) 201110145723.7

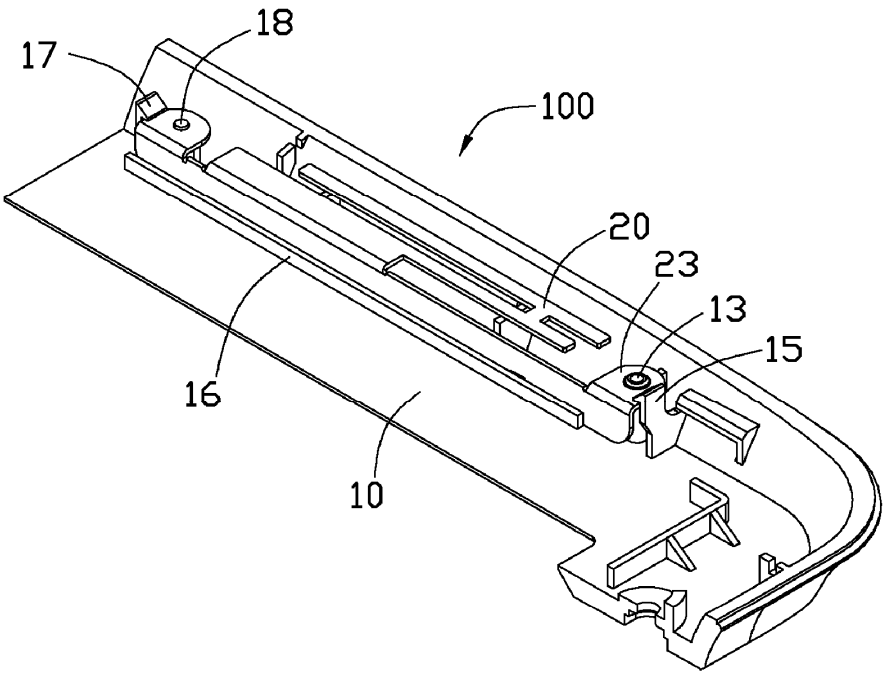
Publication Classification

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

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

(57) **ABSTRACT**

An antenna mounting structure of an electronic device includes a casing and an antenna in the casing. The antenna includes a signal receiving portion and a first securing member connecting the signal receiving portion. The first securing member defines a through hole. The casing includes a first pin, a first catch near the first pin, and a first rib extending from the first pin. The first pin extends through the through hole of the first securing member of the antenna. The first rib supports the first securing member. The first catch fixedly clasps the first securing member on the first pin and the first rib.



US 20120306705A1

(19) **United States**

(12) **Patent Application Publication**

Sakurai et al.

(10) **Pub. No.: US 2012/0306705 A1**

(43) **Pub. Date: Dec. 6, 2012**

(54) **RADIO COMMUNICATION APPARATUS AND CURRENT REDUCING METHOD**

(75) Inventors: **Masanori Sakurai**, Tokyo (JP); **Naoki Kobayashi**, Tokyo (JP); **Noriaki Ando**, Tokyo (JP); **Hiroshi Toyao**, Tokyo (JP); **Masaharu Imazato**, Tokyo (JP)

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

(21) Appl. No.: **13/576,192**

(22) PCT Filed: **Mar. 25, 2011**

(86) PCT No.: **PCT/JP2011/001760**

§ 371 (c)(1),
(2), (4) Date: **Jul. 31, 2012**

(30) **Foreign Application Priority Data**

Mar. 31, 2010 (JP) 2010-081440
Mar. 31, 2010 (JP) 2010-081473

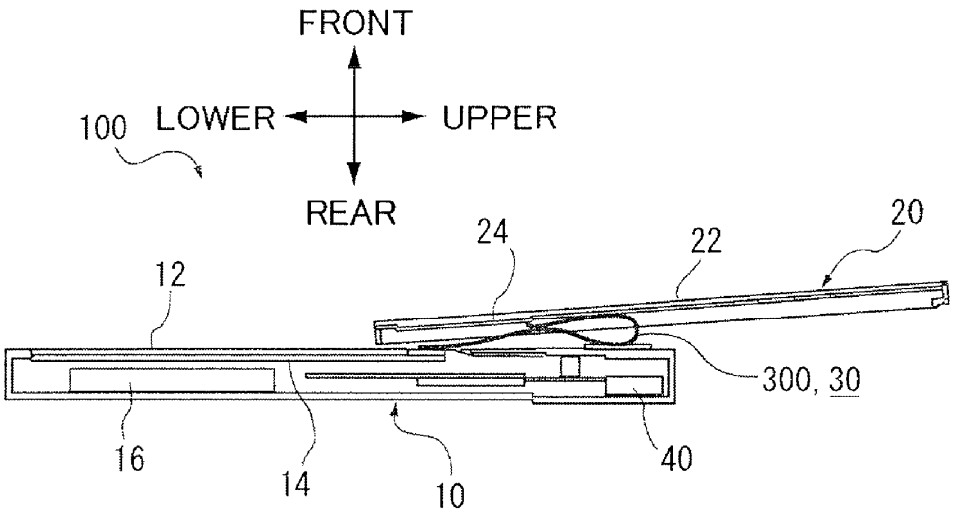
Publication Classification

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

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

(57) **ABSTRACT**

A radio communication apparatus includes: a first casing; a second casing; a connection section that connects the first and second casings to each other to be movable; and an antenna device that operates at a predetermined communication frequency. In the radio communication apparatus, first and second states are switched between by relatively moving the first and second casings. The first state is a state in which the first and second casings are opened or closed with respect to one another, and a first conductor (**122**) installed from the connection section to the first casing and a second conductor (**240**) installed from the connection section to the second casing are separated and faced each other. In the first state, the first conductor (**122**) and the second conductor (**240**) are electrically connected to each other at the communication frequency. The second state is a state in which the first and second casings are closed or opened with respect to one another.



US 20120306707A1

(19) **United States**

(12) **Patent Application Publication**

YANG et al.

(10) **Pub. No.: US 2012/0306707 A1**

(43) **Pub. Date: Dec. 6, 2012**

(54) **LOW-PROFILE MULTIBAND ANTENNA FOR A WIRELESS COMMUNICATION DEVICE**

(76) Inventors: **Guangli YANG**, San Diego, CA (US); **Xiaotao Liang**, East Northport, NY (US); **Mikhail Bruk**, Hicksville, NY (US); **Dean La Rosa**, Bohemia, NY (US)

(21) Appl. No.: **13/150,754**

(22) Filed: **Jun. 1, 2011**

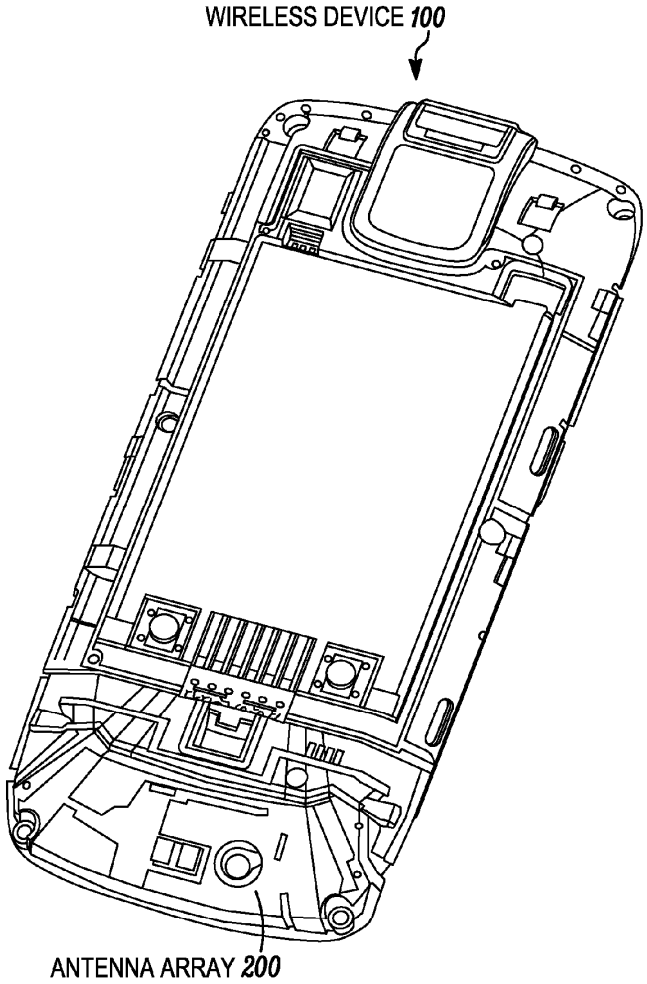
Publication Classification

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

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

(57) **ABSTRACT**

A device for wireless communication including a wireless transceiver, a printed circuit board (PCB) coupled to the wireless transceiver, a first antenna and a second antenna. The first antenna is coupled to the PCB at a feed point and grounded at a ground point. The first antenna is a quarter-wavelength antenna communicating signals with the wireless transceiver at a first frequency band. The second antenna is coupled to the first antenna at the feed point and grounded at a further ground point. The second antenna is a half-wavelength antenna communicating signals with the wireless transceiver at a second frequency band.



US 20120306709A1

(19) **United States**

(12) **Patent Application Publication**

WU et al.

(10) **Pub. No.: US 2012/0306709 A1**

(43) **Pub. Date: Dec. 6, 2012**

(54) **MULTI-BAND ANTENNA**

(75) Inventors: **YI-FENG WU**, Hsinchu County (TW); **Wei-Shan Chang**, Hsinchu County (TW)

(73) Assignee: **Wistron NeWeb Corp.**, Hsinchu County (TW)

(21) Appl. No.: **13/274,611**

(22) Filed: **Oct. 17, 2011**

(30) **Foreign Application Priority Data**

Jun. 3, 2011 (TW) 100119574

Publication Classification

(51) **Int. Cl.**

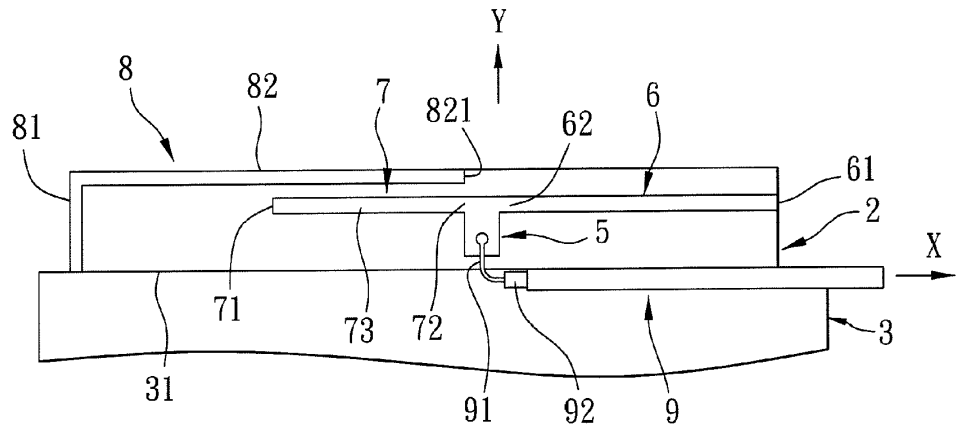
H01Q 5/01 (2006.01)

H01Q 13/10 (2006.01)

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

(57) **ABSTRACT**

A multi-band antenna is to be electrically connected to a transceiving terminal of a radio frequency circuit by a feeding unit and includes a grounding section, a feed-in section electrically connected to the feeding unit, first and second radiator arms respectively disposed at opposite lateral sides of the feed-in section and electrically connected to the feed-in section, and a first coupling component. The first and second radiator arms are configured to generate first and second resonant modes, respectively. When the multi-band antenna transceives radio frequency signals, the second radiator arm and the first coupling component generate a coupling effect such that the first coupling component generates a third resonant mode. Center frequencies of the first, second, and third resonant modes are different from each other.



US 20120306713A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0306713 A1

(43) Pub. Date: Dec. 6, 2012

Raj et al.

(54) **DUAL-POLARISATION DIELECTRIC RESONATOR ANTENNA**

(75) Inventors: **Rohith Kunnath Raj**, Toulouse (FR); **Stéphane Thuries**, Toulouse (FR)

(73) Assignee: **AXESS EUROPE**, Toulouse (FR)

(21) Appl. No.: **13/505,204**

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

(86) PCT No.: **PCT/EP2010/066399**

§ 371 (c)(1),
(2), (4) Date: **Aug. 13, 2012**

(30) **Foreign Application Priority Data**

Nov. 2, 2009 (FR) 09 57737

Publication Classification

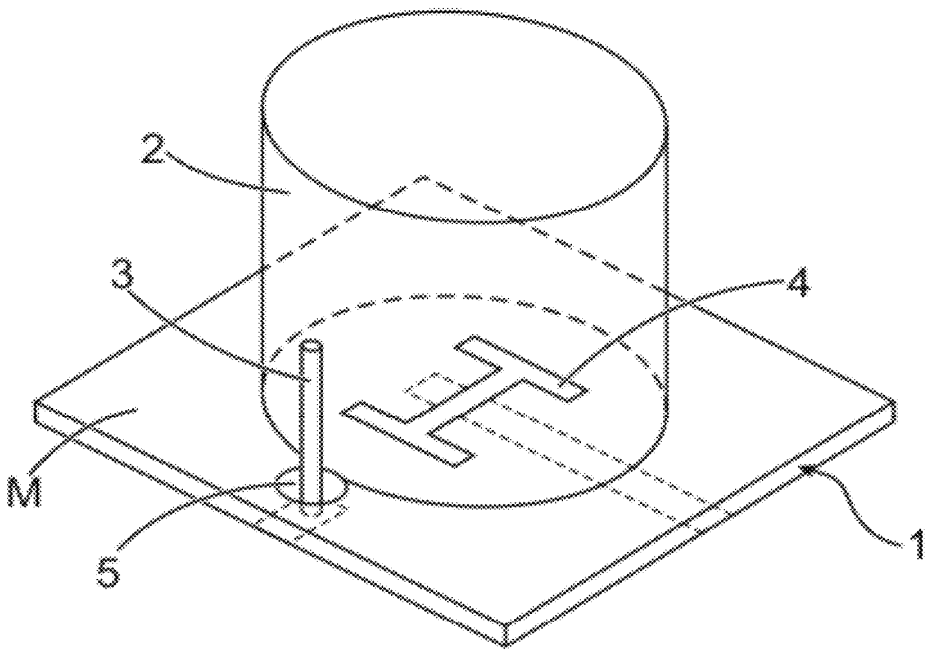
(51) **Int. Cl.**
H01Q 15/08 (2006.01)

(52) **U.S. Cl.** **343/785**

(57) **ABSTRACT**

The invention concerns a dual-polarisation antenna comprising:

- a microstrip substrate (**1**) covered, on a first face, with a metallisation (M) and, on a face opposite to the first face, with two microstrip lines;
- a dielectric resonator (**2**) having the form of a cylinder of revolution fixed to an etching (**4**) formed in the substrate, a first end of a first one of the two microstrip lines forming a first port of the antenna and a first end of the second microstrip line forming a second port of the antenna; and
- an electrically conductive linear element (**3**) placed in contact with the dielectric resonator and connected to a second end of the first line (L**1**), via a hole (**5**) formed in the substrate (**1**), a second end of the second line (L**2**) being substantially vertical to the etching.



US 20120306714A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0306714 A1

(43) Pub. Date: Dec. 6, 2012

YOSUI et al.

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

(75) Inventors: **Kuniaki YOSUI**, Nagaokakyo-shi (JP); **Noboru KATO**, Nagaokakyo-shi (JP)

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

(21) Appl. No.: **13/558,747**

(22) Filed: **Jul. 26, 2012**

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2011/054088, filed on Feb. 24, 2011.

(30) **Foreign Application Priority Data**

Apr. 12, 2010 (JP) 2010-091086

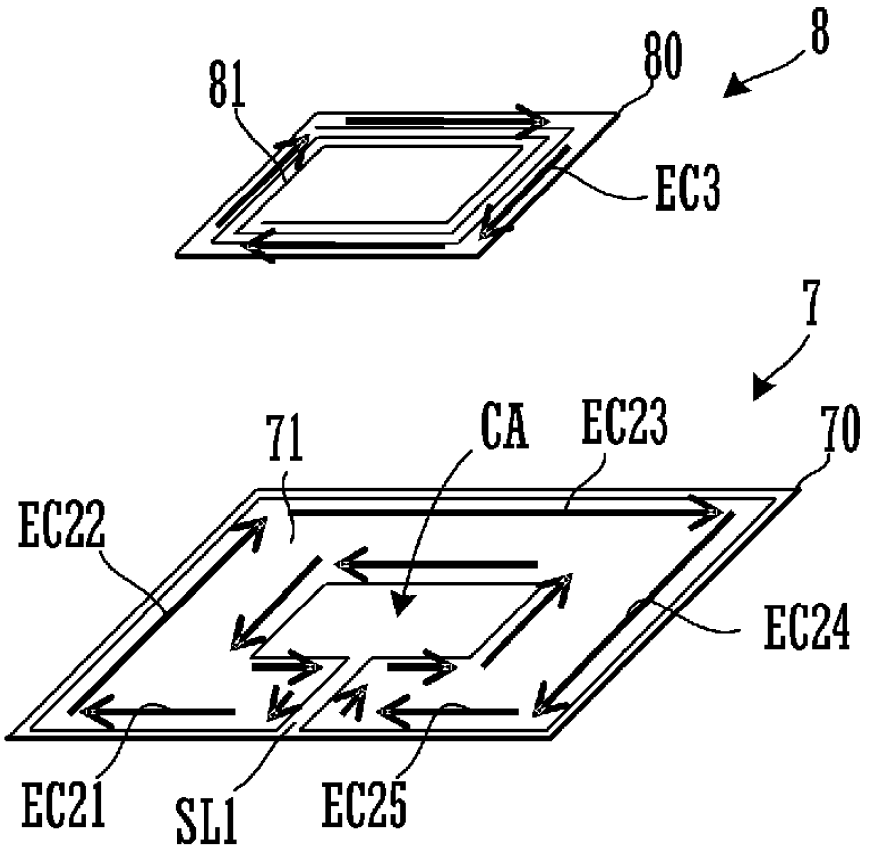
Publication Classification

(51) **Int. Cl.**
H01Q 7/06 (2006.01)

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

(57) **ABSTRACT**

An antenna apparatus includes a power supply coil, a booster electrode sheet, a magnetic sheet, and a ground substrate arranged in this order from the top. The power supply coil includes a spiral coil conductor located on a flexible substrate. The booster electrode sheet includes a booster electrode located on an insulating substrate. The booster electrode includes a conductor region covering the coil conductor, a conductor aperture covering a coil window, and a slit portion connecting the outer edge of the conductor region and the conductor aperture in plan view. The magnetic sheet covers the booster electrode sheet so that the magnetic sheet covers a region slightly larger than a region including the conductor aperture and the slit portion of the booster electrode.



US 20120306715A1

(19) **United States**

(12) **Patent Application Publication**

Montgomery et al.

(10) **Pub. No.: US 2012/0306715 A1**

(43) **Pub. Date: Dec. 6, 2012**

(54) **DETACHABLE ANTENNA FOR RADIO COMMUNICATIONS DEVICE**

(75) Inventors: **Mark T. Montgomery**, Melbourne Beach, FL (US); **Frank M. Caimi**, Vero Beach, FL (US); **Paul A. Tornatta, JR.**, Melbourne, FL (US); **Kyle D. Brink**, Rockledge, FL (US)

(73) Assignee: **SKYCROSS, INC.**, Viera, FL (US)

(21) Appl. No.: **13/308,695**

(22) Filed: **Dec. 1, 2011**

Related U.S. Application Data

(60) Provisional application No. 61/419,075, filed on Dec. 2, 2010.

Publication Classification

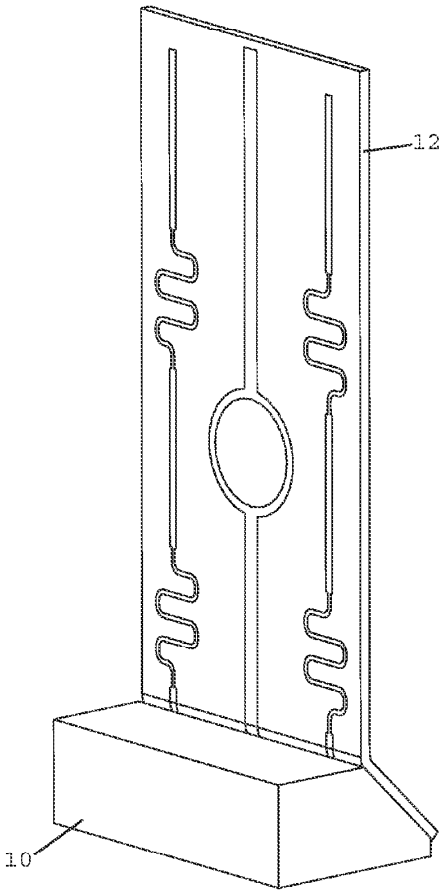
(51) **Int. Cl.**

H01Q 21/00	(2006.01)
H01Q 1/50	(2006.01)
H01Q 9/16	(2006.01)
H01Q 19/00	(2006.01)

(52) **U.S. Cl.** **343/801**; 343/879; 343/833; 343/859; 343/835

(57) **ABSTRACT**

A radio communications device includes a base unit having an enclosure and a radio system inside the enclosure. The device also includes an antenna unit detachably connected to the enclosure of the base unit. The antenna unit includes one or more antennas, each having an electrical radio frequency (RF) connection to the radio system via a non-conductive coupling through the enclosure.



US 20120306718A1

(19) **United States**

(12) **Patent Application Publication**

Koyanagi et al.

(10) **Pub. No.: US 2012/0306718 A1**

(43) **Pub. Date: Dec. 6, 2012**

(54) **ANTENNA AND WIRELESS MOBILE TERMINAL EQUIPPED WITH THE SAME**

(75) Inventors: **Yoshio Koyanagi**, Kanagawa (JP); **Hiroshi Satou**, Kanagawa (JP); **Tomoaki Nishikido**, Ishikawa (JP)

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

(21) Appl. No.: **13/576,271**

(22) PCT Filed: **Feb. 18, 2011**

(86) PCT No.: **PCT/JP2011/000928**

§ 371 (c)(1), (2), (4) Date: **Jul. 31, 2012**

(30) **Foreign Application Priority Data**

Feb. 19, 2010 (JP) 2010-034463

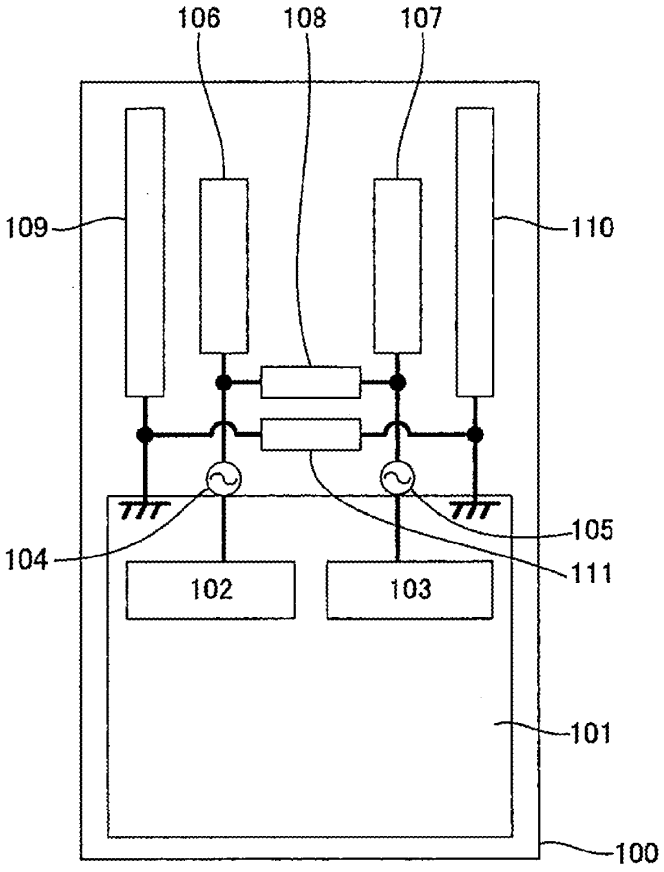
Publication Classification

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

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

(57) **ABSTRACT**

A first connection circuit (**108**) is controlled so as to cancel mutual coupling impedance existing between a first antenna element (**106**) and a second antenna element (**107**) at a first frequency band, thereby lessening deterioration of coupling between the antenna elements. A second connection circuit (**111**) is controlled so as to cancel mutual coupling impedance existing between a first passive element (**109**) and a second passive element (**110**) at a second frequency band, thereby lessening deterioration of coupling between the passive elements. By means of the configuration, it is possible to implement a low-coupling antenna that operates at two frequency bands in a wireless mobile terminal.



US 20120306721A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0306721 A1

(43) Pub. Date: Dec. 6, 2012

Okegawa et al.

(54) SHORTED PATCH ANTENNA DEVICE AND METHOD OF MANUFACTURING THEREFOR

(75) Inventors: **Hirokatsu Okegawa**, Chiyoda-ku (JP); **Takanori Miyame**, Chiyoda-ku (JP); **Takashi Iwakura**, Chiyoda-ku (JP); **Yasuhiro Nishioka**, Chiyoda-ku (JP); **Takashi Yanagi**, Chiyoda-ku (JP)

(73) Assignee: **Mitsubishi Electric Corporation**, Tokyo (JP)

(21) Appl. No.: **13/577,372**

(22) PCT Filed: **Jan. 24, 2011**

(86) PCT No.: **PCT/JP2011/000345**

§ 371 (c)(1), (2), (4) Date: **Aug. 6, 2012**

(30) **Foreign Application Priority Data**

Feb. 5, 2010 (JP) 2010-024250

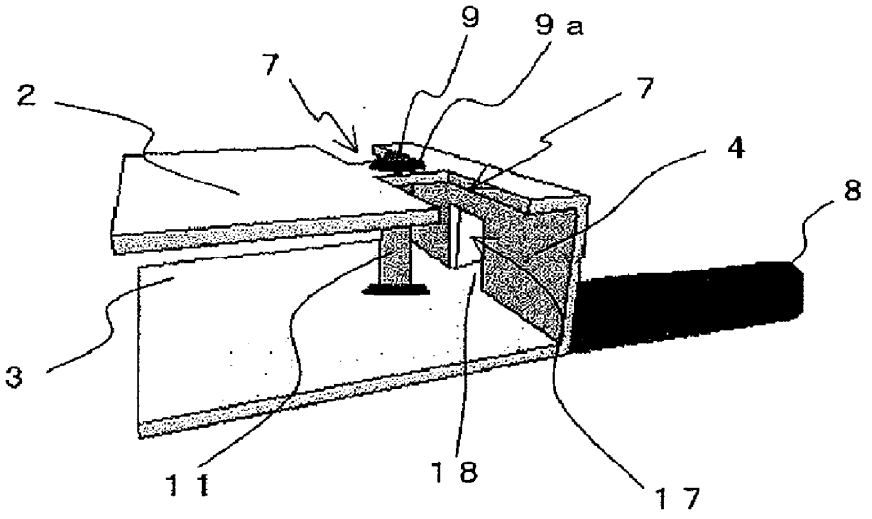
Publication Classification

(51) **Int. Cl.**
H01Q 1/36 (2006.01)
H01P 11/00 (2006.01)

(52) **U.S. Cl.** **343/905**; 29/600

(57) **ABSTRACT**

The present invention relates to a novel shorted patch antenna device that a thickness of a conductor of an antenna, a location of a feeding point and a shape of an antenna element is easily adjustable and can be miniaturized, as well as a method therefor. The shorted patch antenna device includes: an antenna element that is composed of a folded single conductor plate and has a radiation conductor plane (**2**) formed on one of opposing planes of the conductor plate and a ground conductor plane (**3**) formed on the other plane of the opposing planes; a miniaturization section that is composed of a hole (**5**) formed on the ground conductor plane (**3**) and a slit (**7**) cut out from a side of the radiation conductor plane (**2**) or a matching adjustment plane (**31**) formed by bending a tip portion of the radiation conductor plane (**2**) toward the ground conductor plane (**3**); a coaxial line (**8**) whose inner conductor (**9**) extending through the hole (**5**) to the radiation conductor plane (**2**) is electrically connected to the radiation conductor plane (**2**) and whose external conductor (**10**) is grounded to the ground conductor plane (**3**); and a resin (**16**) that fills between the radiation conductor plane (**2**) and the ground conductor plane (**3**) of the antenna element.



US 20120307475A1

(19) **United States**

(12) **Patent Application Publication**

Morita et al.

(10) **Pub. No.: US 2012/0307475 A1**

(43) **Pub. Date: Dec. 6, 2012**

(54) **ELECTRONIC DEVICE**

(76) Inventors: **Hirofumi Morita**, Tokyo (JP); **Naoya Shigenobu**, Tokyo (JP)

(21) Appl. No.: **13/584,305**

(22) Filed: **Aug. 13, 2012**

Related U.S. Application Data

(63) Continuation of application No. 13/045,378, filed on Mar. 10, 2011.

(30) **Foreign Application Priority Data**

May 13, 2010 (JP) 2010-111024

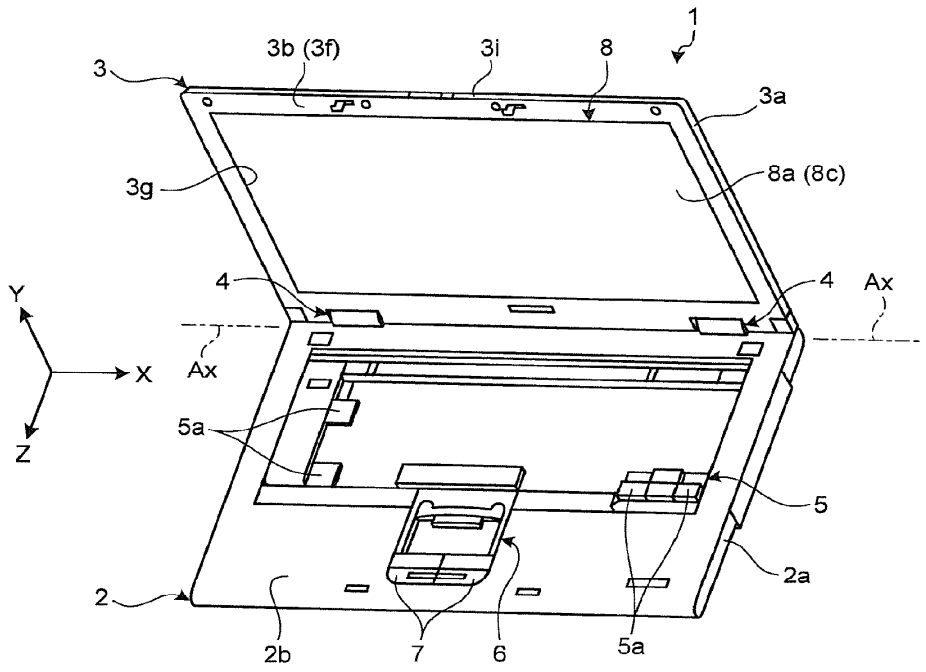
Publication Classification

(51) **Int. Cl.**
H05K 7/02 (2006.01)

(52) **U.S. Cl.** **361/807**

(57) **ABSTRACT**

According to one embodiment, an electronic device includes a housing, a support member, and an antenna. The housing houses an electronic component. The support member is fixed to the housing. The antenna is fixed to the support member. The support member is arranged spaced apart from an outer surface of a main body of the electronic component.



US 20120308058A1

(19) **United States**

(12) **Patent Application Publication**

Polinske

(10) **Pub. No.: US 2012/0308058 A1**

(43) **Pub. Date: Dec. 6, 2012**

(54) **ANTENNAS FOR HEARING AIDS**

(75) Inventor: **Beau Jay Polinske**, Minneapolis, MN (US)

(73) Assignee: **Starkey Laboratories, Inc.**, Eden Prairie, MN (US)

(21) Appl. No.: **13/410,042**

(22) Filed: **Mar. 1, 2012**

Related U.S. Application Data

(63) Continuation of application No. 12/550,821, filed on Aug. 31, 2009, now Pat. No. 8,180,080, which is a continuation of application No. 11/357,751, filed on Feb. 17, 2006, now Pat. No. 7,593,538, which is a continuation of application No. 11/287,892, filed on Nov. 28, 2005, now abandoned, which is a continuation of application No. 11/091,748, filed on Mar. 28, 2005, now abandoned.

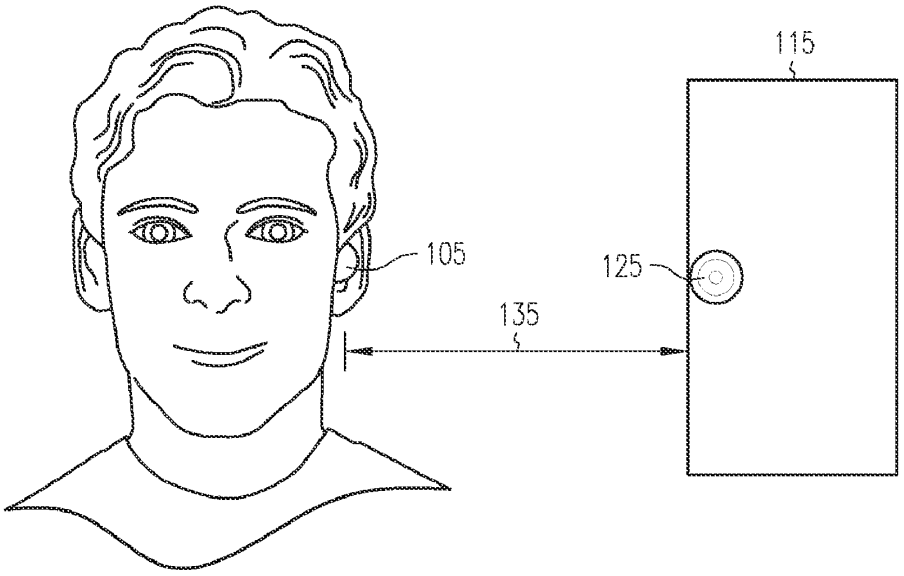
Publication Classification

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

(52) **U.S. Cl.** **381/315**

(57) **ABSTRACT**

An antenna configured in a hybrid circuit provides a compact design for a hearing aid to communicate wirelessly with a system external to the hearing aid. In an embodiment, an antenna includes metallic traces in a hybrid circuit that is configured for use in a hearing aid. The antenna includes contacts in the hybrid circuit to couple the metallic traces to electronic devices in the hybrid circuit. In an embodiment, the metallic traces form a planar coil design having a number of turns of the coil in a substrate in the hybrid circuit. In another embodiment, the metallic traces are included in a flex circuit on a substrate in the hybrid circuit. An antenna configured in a hybrid circuit allows for use in a completely-in-the-canal hearing aid.



US 20120309326A1

(19) **United States**

(12) **Patent Application Publication**

Maguire

(10) **Pub. No.: US 2012/0309326 A1**

(43) **Pub. Date: Dec. 6, 2012**

(54) **SWITCHABLE ANTENNA ELEMENTS FOR A WIRELESS COMMUNICATIONS DEVICE**

(75) Inventor: **Yael G. Maguire**, Boston, MA (US)

(73) Assignee: **PLUM LABS, LLC**, Somerville, MA (US)

(21) Appl. No.: **13/485,139**

(22) Filed: **May 31, 2012**

Related U.S. Application Data

(60) Provisional application No. 61/491,380, filed on May 31, 2011.

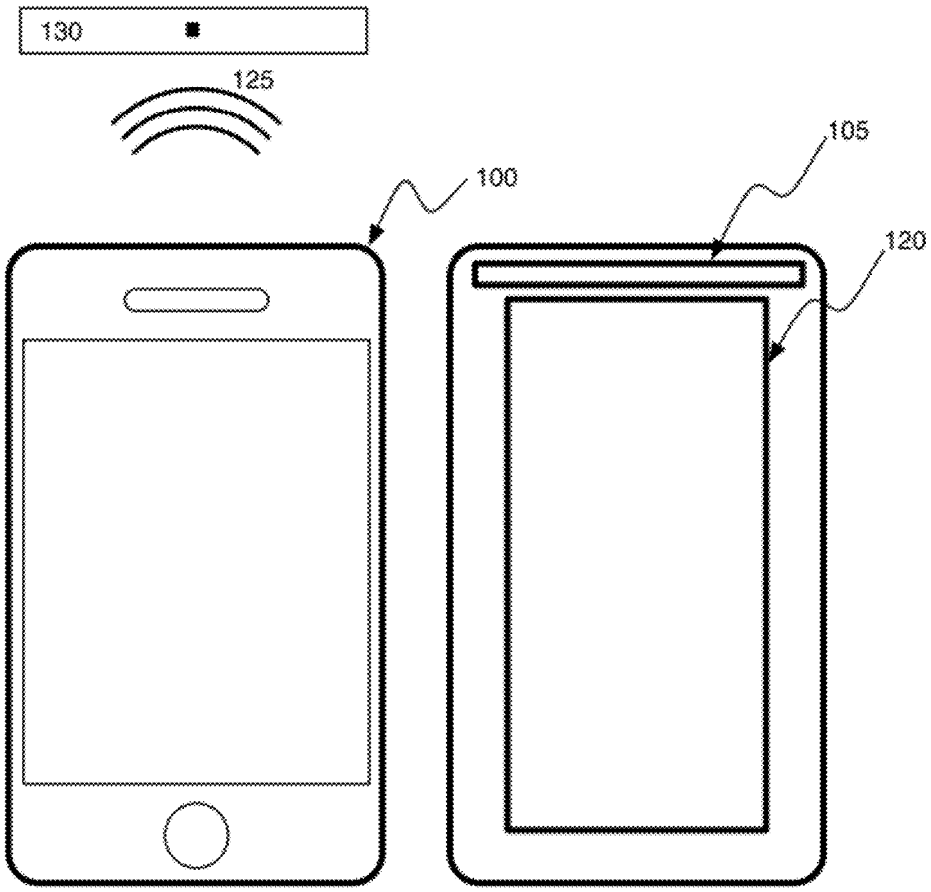
Publication Classification

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

(52) **U.S. Cl.** **455/73**

(57) **ABSTRACT**

A wireless communications device includes multiple switchable antenna elements that may be used to improve interfacing of the wireless communications device with other devices, such as for interfacing of an RFID-equipped mobile communications device with other RFID devices (e.g., to better ensure power delivery to and/or communication with such other RFID devices) and/or may be used to characterize various aspects of the environment around the wireless communications device, such as for proximity-based functionality.



US 20120309329A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0309329 A1

(43) Pub. Date: Dec. 6, 2012

He et al.

(54) **DEVICE AND EQUIPMENT FOR FOUR-FREQUENCY TRANSCEIVING OF GLOBAL SYSTEM FOR MOBILE COMMUNICATION**

(75) Inventors: **Wenqing He**, Shenzhen (CN); **Juan Yu**, Shenzhen (CN); **Hu Ge**, Shenzhen (CN)

(73) Assignee: **ZTE CORPORATION**, Shenzhen, Guangdong (CN)

(21) Appl. No.: **13/577,330**

(22) PCT Filed: **Sep. 19, 2010**

(86) PCT No.: **PCT/CN10/77091**

§ 371 (c)(1), (2), (4) Date: **Aug. 6, 2012**

(30) **Foreign Application Priority Data**

Jul. 7, 2010 (CN) 201010223521.5

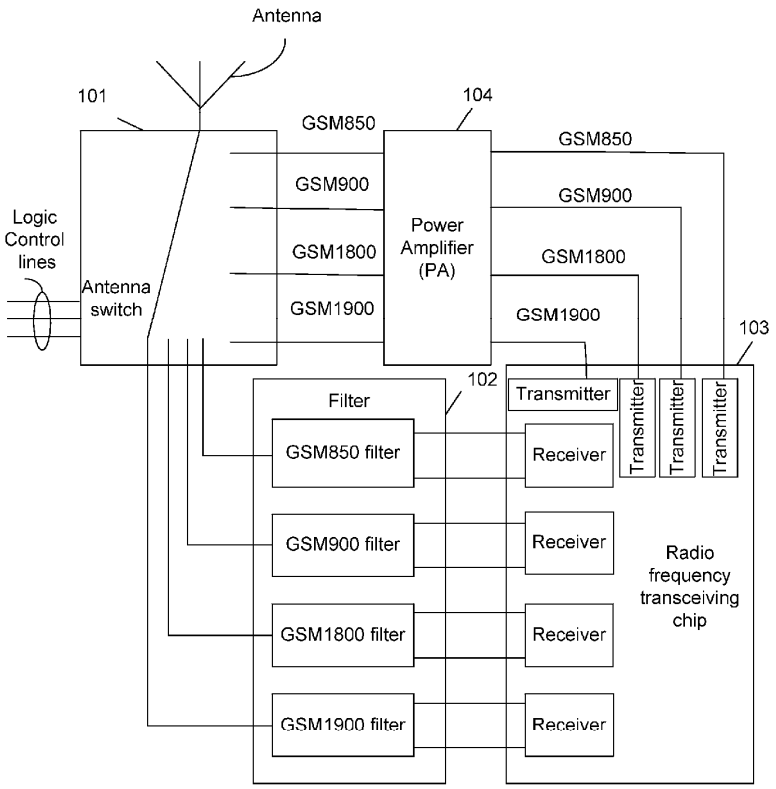
Publication Classification

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

(52) **U.S. Cl.** **455/83**

(57) **ABSTRACT**

The present disclosure discloses a device for four-frequency transceiving of a Global System for Mobile Communication (GSM), comprising a Power Amplifier (PA), a radio frequency transceiving chip, a baseband control chip, an antenna switch, a GSM low frequency filter and a GSM high frequency filter. The antenna switch receives a control signal transmitted from the baseband control chip, and the antenna switch connects to a corresponding line according to the control signal, and transmits signals between the antenna and the connected line; the GSM low frequency filter receives the signals of a first frequency band or a second frequency band which are transmitted by the antenna switch, and passes the signals of the first frequency band or the second frequency band; the GSM high frequency filter receives the signals of a third frequency band or a fourth frequency band which are transmitted by the antenna switch, and passes the signals of the third frequency band and the fourth frequency band. The present disclosure also discloses an equipment for four-frequency transceiving of GSM. By adopting the device and the equipment disclosed by the present disclosure, lines can be simplified, and the cost can be reduced.



US 20120313819A1

(19) **United States**

(12) **Patent Application Publication**

Li et al.

(10) **Pub. No.: US 2012/0313819 A1**

(43) **Pub. Date: Dec. 13, 2012**

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

(76) Inventors: **Chia-Tien Li**, Hsinchu (TW); **Li-Jean Yen**, Hsinchu (TW)

(21) Appl. No.: **13/236,652**

(22) Filed: **Sep. 20, 2011**

(30) **Foreign Application Priority Data**

Jun. 13, 2011 (TW) 100120543

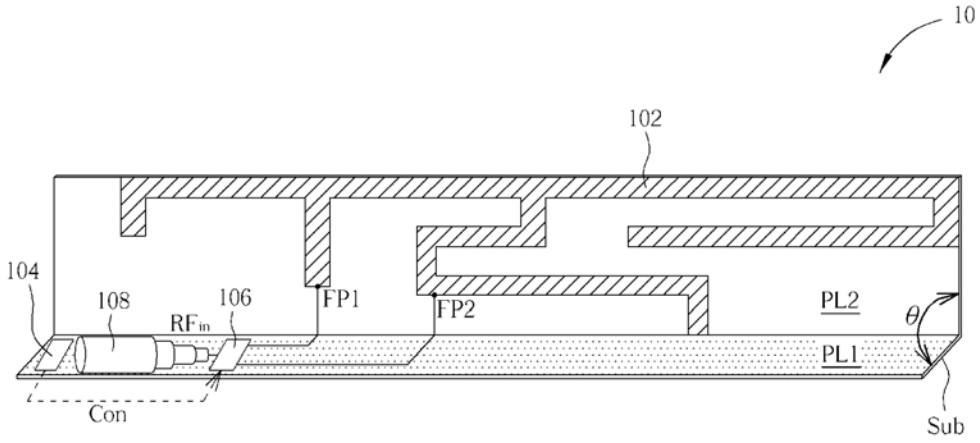
Publication Classification

(51) **Int. Cl.**
H01Q 3/12 (2006.01)

(52) **U.S. Cl.** **342/374**

(57) **ABSTRACT**

An active antenna with a wide bandwidth coverage is disclosed. The active antenna comprises a radiator, comprising at least two feeding points corresponding to two modes, a switch control circuit, for generating a switch control signal, and an active switch circuit, for switching to be coupled to one of the at least two feeding points.



US 20120313821A1

(19) **United States**

(12) **Patent Application Publication**

Fischer

(10) **Pub. No.: US 2012/0313821 A1**

(43) **Pub. Date: Dec. 13, 2012**

(54) **ANTENNA MODULE HAVING INTEGRATED RADIO FREQUENCY CIRCUITRY**

(75) Inventor: **Larry G. Fischer**, Waseca, MN (US)

(73) Assignee: **LGC WIRELESS, LLC**, San Jose, CA (US)

(21) Appl. No.: **13/492,339**

(22) Filed: **Jun. 8, 2012**

Related U.S. Application Data

(60) Provisional application No. 61/495,235, filed on Jun. 9, 2011.

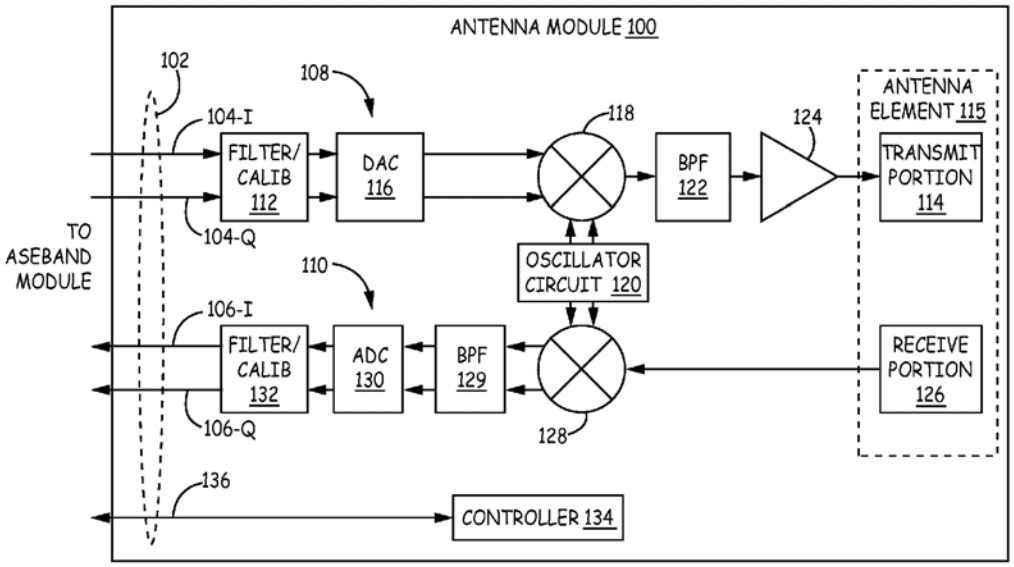
Publication Classification

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

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

(57) **ABSTRACT**

One embodiment is directed to an antenna module comprising integrated RF circuitry comprising at least one of a transmitter and a receiver. The module further comprises an antenna element operatively coupled to the integrated RF circuitry, the antenna element comprising first and second substantially co-planar portions. The integrated RF circuitry is disposed on an interior part of at least one of the first and second substantially co-planar portions. Other embodiments are disclosed.



US 20120313822A1

(19) **United States**

(12) **Patent Application Publication**

LONG

(10) **Pub. No.: US 2012/0313822 A1**

(43) **Pub. Date: Dec. 13, 2012**

(54) **MULTIPLE LAYER DIELECTRIC PANEL DIRECTIONAL ANTENNA**

(76) Inventor: **XIZHONG LONG**, (US)

(21) Appl. No.: **13/494,001**

(22) Filed: **Jun. 11, 2012**

Related U.S. Application Data

(60) Provisional application No. 61/495,519, filed on Jun. 10, 2011.

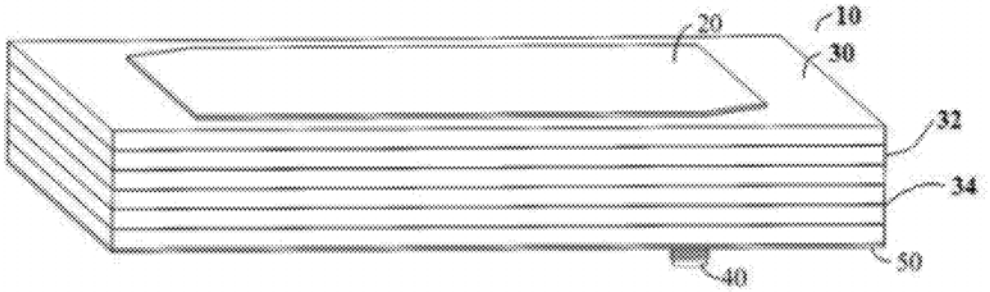
Publication Classification

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

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

(57) **ABSTRACT**

A directional antenna has a body made of a stack of layers of dielectric panels. A radiating plate is recessed in the top panel of the stack. A grounding plate is attached to the bottom panel of the stack. A feed wire attaches to the radiating plate to feed a signal to the radiating plate. A grounding conductor attaches to the grounding plate for ground. In at least one embodiment the internal feed wire of a coaxial connector provides the feed wire and the external chassis of the coaxial connector provides the grounding conductor.



US 20120313825A1

(19) **United States**

(12) **Patent Application Publication**

Kuramoto et al.

(10) **Pub. No.: US 2012/0313825 A1**

(43) **Pub. Date: Dec. 13, 2012**

(54) **ANTENNA ASSEMBLY AND PORTABLE WIRELESS TERMINAL**

(76) Inventors: **Mikio Kuramoto**, Osaka-shi (JP); **Hiroyuki Takebe**, Osaka-shi (JP); **Hiroyasu Suetake**, Osaka-shi (JP); **Toshinori Kondo**, Osaka-shi (JP); **Nozomu Hikino**, Osaka-shi (JP)

(21) Appl. No.: **13/580,937**

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

(86) PCT No.: **PCT/JP2011/053866**

§ 371 (c)(1), (2), (4) Date: **Aug. 23, 2012**

(30) **Foreign Application Priority Data**

Feb. 24, 2010 (JP) 2010-039289

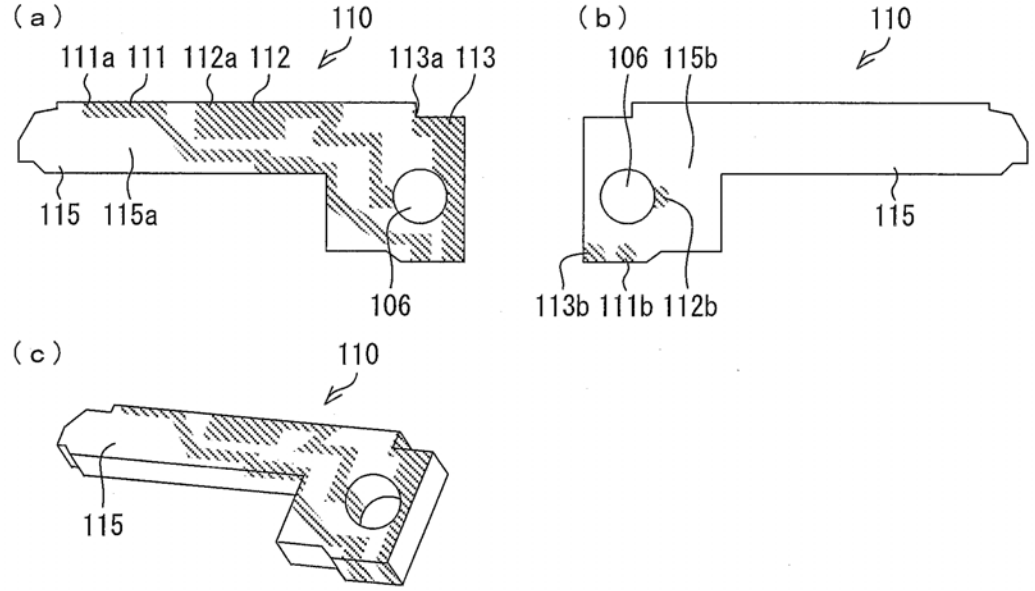
Publication Classification

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

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

(57) **ABSTRACT**

An antenna assembly (**110**) includes an antenna base (**115**) and antenna elements (**111** to **113**) formed on a surface of the antenna base (**115**). The antenna base (**115**) has: a connection surface (**115***b*) on which connecting ends (**111***b* to **113***b*) of the antenna elements (**111** to **113**) are formed, the connecting ends (**111***b* to **113***b*) being connected to the wireless section circuit; and a through hole (**106**) formed through the antenna base (**115**) from the connection surface (**115***b*) to another surface (**115***a*). At least one of the antenna elements, for example, an antenna element (**112**) is configured so as to pass through the through hole (**106**).



US 20120313828A1

(19) **United States**

(12) **Patent Application Publication**

Yanagi et al.

(10) **Pub. No.: US 2012/0313828 A1**

(43) **Pub. Date: Dec. 13, 2012**

(54) **MEMORY CARD**

(75) Inventors: **Masahiro Yanagi**, Tokyo (JP); **Shigemi Kurashima**, Tokyo (JP); **Hideaki Yoda**, Tokyo (JP)

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

(21) Appl. No.: **13/476,307**

(22) Filed: **May 21, 2012**

(30) **Foreign Application Priority Data**

Jun. 13, 2011 (JP) 2011-131666

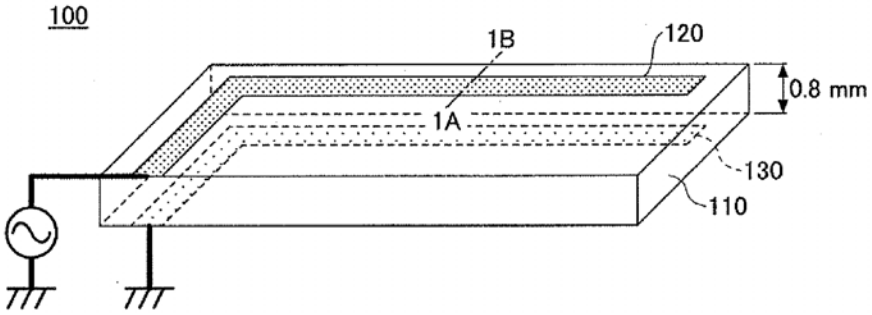
Publication Classification

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

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

(57) **ABSTRACT**

A disclosed memory card having a built-in antenna and being connected to an electronic apparatus includes a circuit board configured to be covered by a case, an antenna element formed on one surface of the circuit board or on one surface of a board mounted on the circuit board, and a ground element formed on another surface of the circuit board or on another surface of the board mounted on the circuit board, wherein a part or all of the antenna element and a part or all of the ground element are formed to protrude outside the electronic apparatus when the memory card is connected to the electronic apparatus.



US 20120313830A1

(19) **United States**

(12) **Patent Application Publication**

Lee

(10) **Pub. No.: US 2012/0313830 A1**

(43) **Pub. Date: Dec. 13, 2012**

(54) **MULTI-BAND ANTENNA**

(76) Inventor: **Cheng-Jung Lee**, Santa Clara, CA (US)

(21) Appl. No.: **13/211,138**

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Related U.S. Application Data

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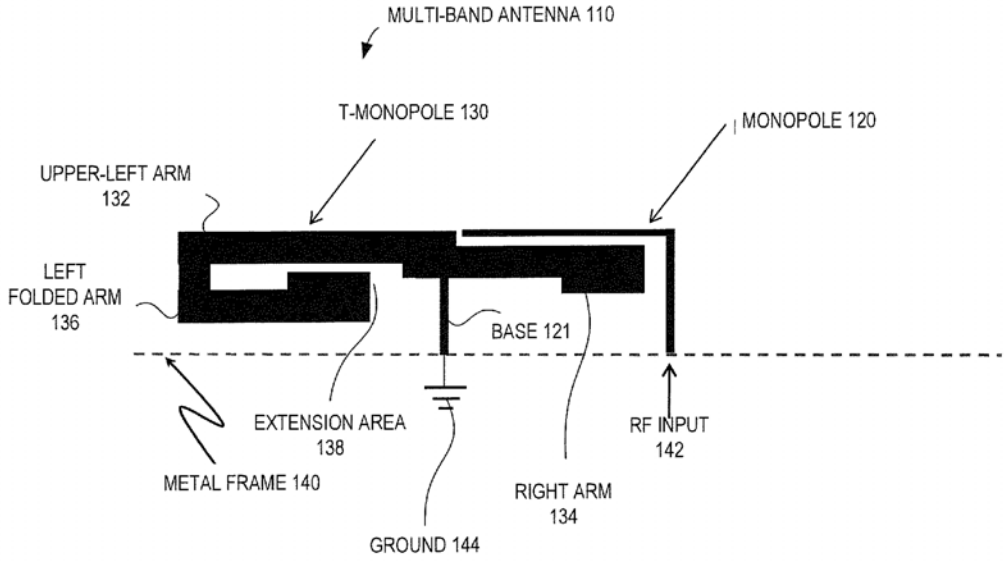
Publication Classification

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

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

(57) **ABSTRACT**

Methods and systems for extending a bandwidth of a multi-band antenna of a user device are described. A multi-band antenna includes a single radio frequency (RF) input coupled to a first antenna, the first antenna configured to provide a first resonant mode. The multi-band antenna also includes a second antenna parasitically coupled to the first antenna to provide additional resonant modes of the multi-band antenna.



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(19) **United States**

(12) **Patent Application Publication**

EOM et al.

(10) **Pub. No.: US 2012/0313834 A1**

(43) **Pub. Date: Dec. 13, 2012**

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

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(21) Appl. No.: **13/435,269**

(22) Filed: **Mar. 30, 2012**

(30) **Foreign Application Priority Data**

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Publication Classification

(51) **Int. Cl.**

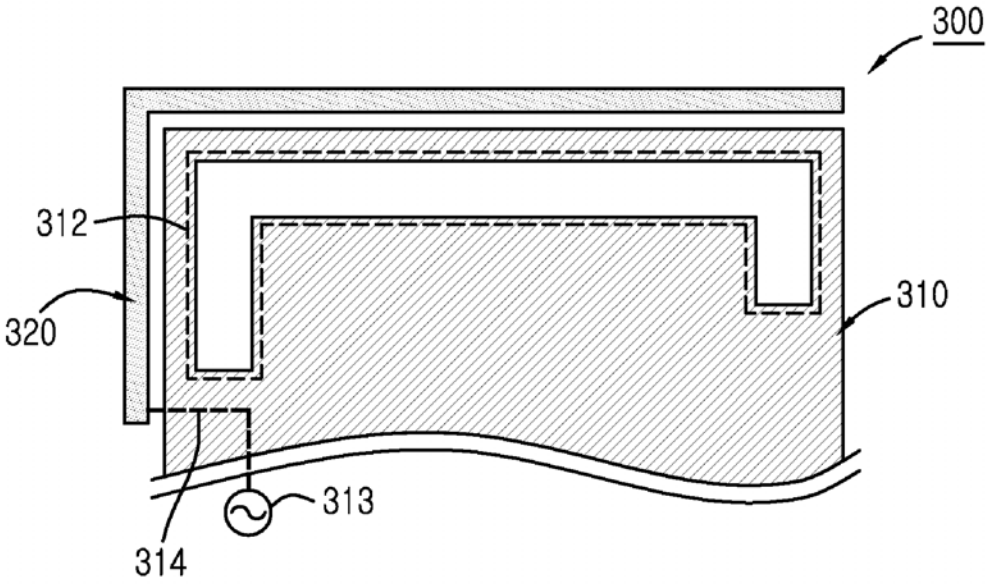
H01Q 9/04 (2006.01)

H01Q 1/00 (2006.01)

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

(57) **ABSTRACT**

An antenna device attains good antenna performance using at least one or more metal members installed in a portable terminal The antenna device includes a main board equipped with a power supply part for supplying power, a slot part which is positioned in at least one or more metal members or is formed by a combination of the metal members, and a power supply antenna member for receiving power from the power supply part and which is electromagnetically coupled with the slot part.



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(19) **United States**

(12) **Patent Application Publication**

CHOU

(10) **Pub. No.: US 2012/0313836 A1**

(43) **Pub. Date: Dec. 13, 2012**

(54) **ANTENNA MODULE**

(75) Inventor: **MING-YU CHOU**, Tu-Cheng (TW)

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

(21) Appl. No.: **13/216,740**

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

(30) **Foreign Application Priority Data**

Jun. 13, 2011 (TW) 100120555

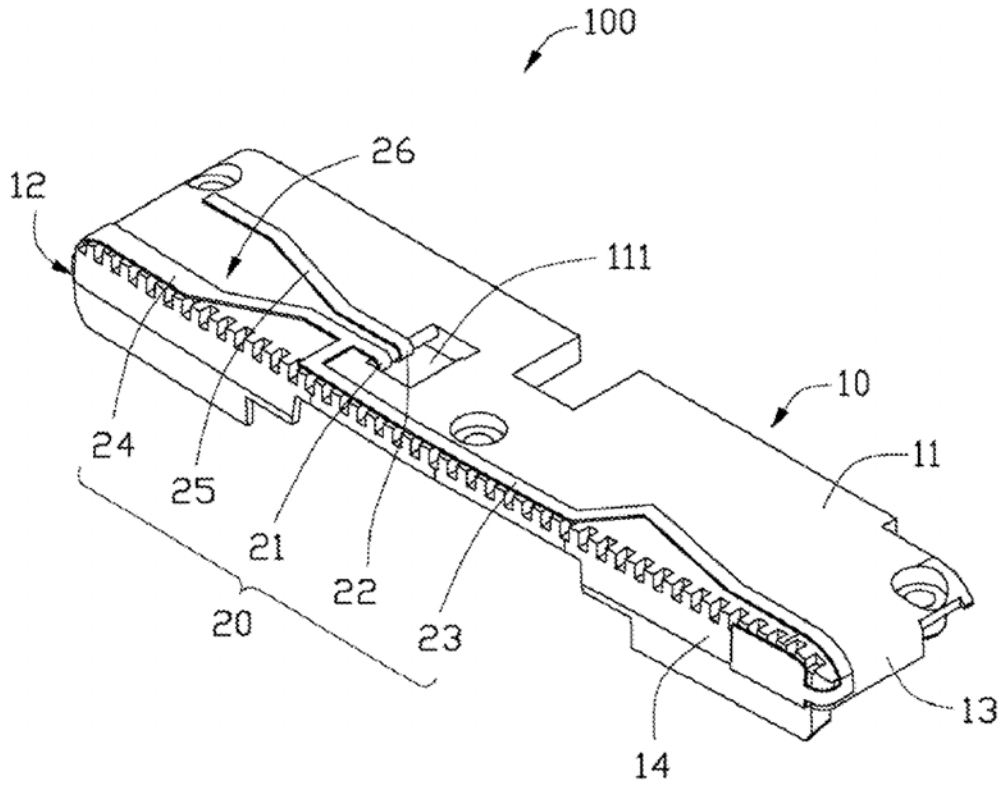
Publication Classification

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

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

(57) **ABSTRACT**

An antenna module includes a support and an antenna. The support includes an upper surface and has a through hole defined in a middle of the upper surface. The antenna includes a feed unit, a first radiator unit, and a second radiator unit. One end of the feed unit is positioned on the upper surface. The other end of the feed unit passes through the through hole, and extends and attaches to a surface opposite to the upper surface. The first radiator unit and the second radiator unit are both connected to the end of the feed unit positioned on the upper surface, and both extend away from the feed unit.



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(19) **United States**

(12) **Patent Application Publication**

LEE et al.

(10) **Pub. No.: US 2012/0319904 A1**

(43) **Pub. Date: Dec. 20, 2012**

(54) **MULTI-INPUT MULTI-OUTPUT ANTENNA WITH MULTI-BAND CHARACTERISTIC**

(76) Inventors: **Jae Ho LEE**, Hwaseong-si (KR); **Kook Hyun Kim**, Seoul (KR); **Kyung Sub Lee**, Suwon-si (KR); **Hyuk-Jin Kang**, Seoul (KR)

(21) Appl. No.: **13/295,874**

(22) Filed: **Nov. 14, 2011**

(30) **Foreign Application Priority Data**

Jun. 16, 2011 (KR) 10-2011-0058657

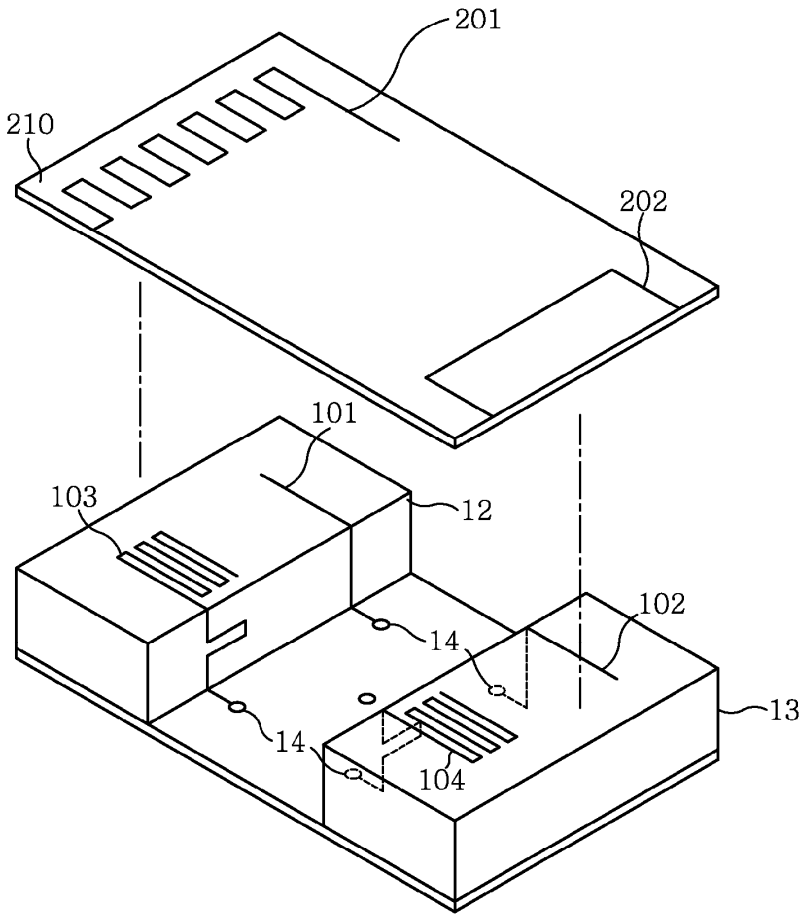
Publication Classification

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

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

(57) **ABSTRACT**

The present invention relates to a multi-input multi-output (MIMO) antenna with a multi-band characteristic which includes a plurality of MIMO antenna, each having a pair of antenna elements, to support multiple bands, and is capable of guaranteeing high antenna efficiency for different bands by minimizing an interference between antenna elements of each MIMO antenna to improve an isolation characteristic. The MIMO antenna system having a multi-band characteristic, which includes two pairs of antenna patterns to support different band and coupling antenna parts separated from and coupled with the pairs of antenna patterns, can improve an isolation through the coupling antenna parts and guarantee an antenna gain. Moreover, since signal interference caused by the coupling effect can be cancelled to guarantee a band width with no change in antenna characteristics, it is possible to constructing two or more antennas to support a multi-band while guaranteeing stable operation of the antennas.



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(19) **United States**

(12) **Patent Application Publication**

Irmscher et al.

(10) **Pub. No.: US 2012/0319909 A1**

(43) **Pub. Date: Dec. 20, 2012**

(54) **ANTENNA DEVICES AND PORTABLE ELECTRONIC DEVICES COMPRISING SUCH ANTENNA DEVICES**

(76) Inventors: **Stefan Irmscher**, Taby (SE); **Andrei Kaikkonen**, Jarfalla (SE); **Peter Lindberg**, Uppsala (SE)

(21) Appl. No.: **13/599,855**

(22) Filed: **Aug. 30, 2012**

Related U.S. Application Data

(63) Continuation of application No. PCT/EP2010/055462, filed on Apr. 23, 2010.

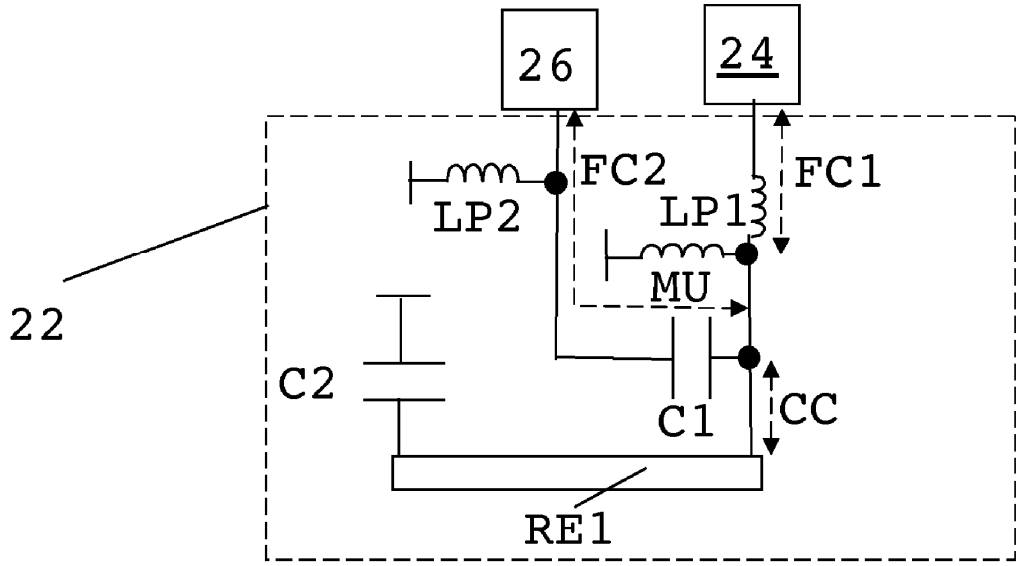
Publication Classification

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

(52) **U.S. Cl.** **343/749**

(57) **ABSTRACT**

An exemplary embodiment of an antenna device generally includes a radiator structure with at least one first radiator element. The antenna device also includes a first feeding connection coupling the radiator structure to a first radio circuit for operation in a first frequency band. The antenna device further includes a second feeding connection coupling the radiator structure to a second radio circuit for operation in a second frequency band. A set of capacitors is connected to the radiator structure. This set includes at least one capacitor where a first end of each capacitor in the set is connected to the radiator structure and a second end is provided at ground potential, at least for the first frequency band. The sum of the values of the capacitors in the set is below 15 picofarads.



US 20120319913A1

(19) **United States**

(12) **Patent Application Publication**

Tsutsumi et al.

(10) **Pub. No.: US 2012/0319913 A1**

(43) **Pub. Date: Dec. 20, 2012**

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

(75) Inventors: **Yukako Tsutsumi**, Kawasaki-shi (JP); **Takayoshi Ito**, Yokohama-shi (JP); **Shuichi Obayashi**, Yokohama-shi (JP)

(73) Assignee: **KABUSHIKI KAISHA TOSHIBA**

(21) Appl. No.: **13/542,149**

(22) Filed: **Jul. 5, 2012**

Related U.S. Application Data

(63) Continuation-in-part of application No. PCT/JP2010/000007, filed on Jan. 5, 2010.

Publication Classification

(51) **Int. Cl.**

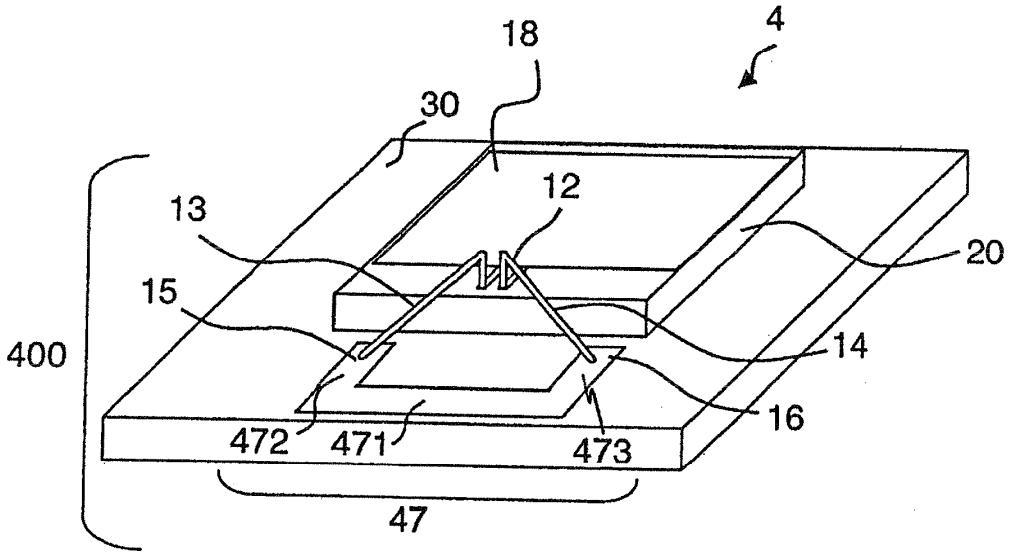
H01Q 7/06 (2006.01)

H01Q 7/00 (2006.01)

(52) **U.S. Cl.** **343/788**; 343/870

(57) **ABSTRACT**

According to one embodiment, an antenna device includes a feeding portion, first and second wire-like metal portions, third and fourth plate-like metal portions and a fifth metal portion. One ends of the first and second wire-like metal portions are connected to the feeding portion. The third and fourth plate-like metal portions are respectively connected to the other ends of the first and second metal portions and disposed separately from each other with a predetermined distance therebetween. The fifth metal portion is configured to connect the third metal portion to the fourth metal portion. A total electrical length of the first to fifth metal portions is 3/2 wavelength at operating frequency band.



US 20120319919A1

(19) **United States**

(12) **Patent Application Publication**

Kirovski et al.

(10) **Pub. No.: US 2012/0319919 A1**

(43) **Pub. Date: Dec. 20, 2012**

(54) **PIFA ARRAY**

(75) Inventors: **Darko Kirovski**, Kirkland, WA (US); **Gerald DeJean**, Redmond, WA (US); **Miller Abel**, Mercer Island, WA (US); **Yingyi Zou**, Redmond, WA (US); **Craig Brenner**, Sammamish, WA (US)

(73) Assignee: **MICROSOFT CORPORATION**, Redmond, WA (US)

(21) Appl. No.: **13/163,082**

(22) Filed: **Jun. 17, 2011**

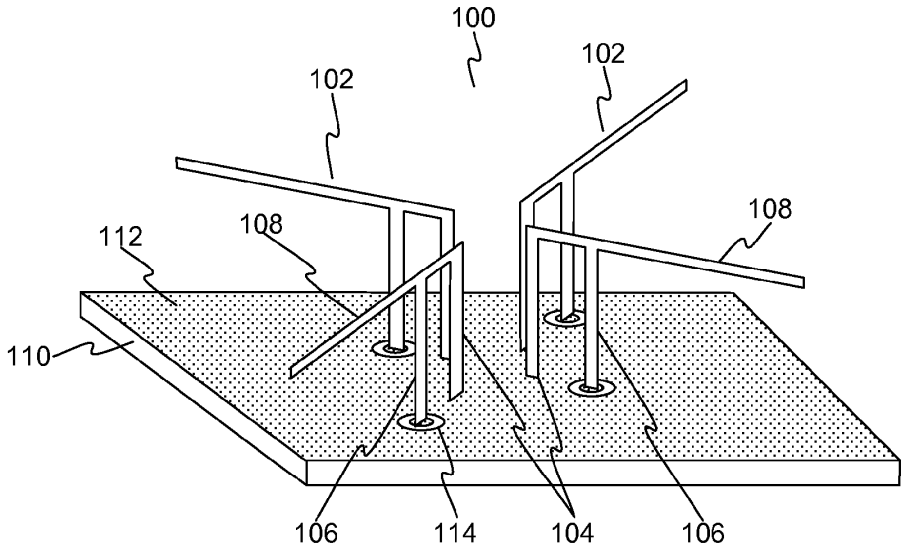
Publication Classification

(51) **Int. Cl.**
H01Q 3/34 (2006.01)

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

(57) **ABSTRACT**

A PIFA (Planar Inverted-F Antenna) array antenna has multiple PIFAs. The PIFA array is used to provide different radiation patterns for communication. A signal being emitted by the PIFA array is manipulated. According to the manipulation, the PIFA array may emit the signal with an omni-directional radiation pattern or a directional radiation pattern; the same PIFA array (antenna) is used for both directional communication and omni-directional communication. The PIFA array may be used in mobile computing devices, smart phones, or the like, allowing such devices to transmit directionally and omni-directionally. The signal manipulation may involve splitting the signal into components that feed PIFAs, and before the components reach the PIFAs, changing properties of the components (e.g., phase) relative to each other.



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(19) **United States**

(12) **Patent Application Publication**

Fuchs et al.

(10) **Pub. No.: US 2012/0319922 A1**

(43) **Pub. Date: Dec. 20, 2012**

(54) **SINGLE-FEED MULTI-FREQUENCY MULTI-POLARIZATION ANTENNA**

(75) Inventors: **Andreas D. Fuchs**, Lake Orion, MI (US); **Elias H. Ghafari**, Rochester Hills, MI (US); **Nikola Dobric**, Munich (DE)

(73) Assignee: **BLAUPUNKT ANTENNA SYSTEMS USA, INC.**, Rochester Hills, MI (US)

(21) Appl. No.: **13/288,467**

(22) Filed: **Nov. 3, 2011**

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/159,775, filed on Jun. 14, 2011.

Publication Classification

(51) **Int. Cl.**

H01Q 1/38	(2006.01)
H01Q 1/50	(2006.01)
H01Q 1/42	(2006.01)

(52) **U.S. Cl.** ..... **343/872**; 343/700 MS; 343/906

(57) **ABSTRACT**

An antenna capable of receiving both left-hand circularly polarized (LHCP) signals and right-hand circularly polarized (RHCP) signals, and outputting both signals on a single feed. The antenna includes two coplanar concentric patches. The inner patch is substantially square. The outer patch surrounds the inner patch to define a gap therebetween. A resonant parallel inductive/LC circuit interconnects the two patches. The circuit includes a plurality of printed traces within the gap and interconnecting the concentric patches. The gap and each trace function as an LC circuit.