US 20130186961A1

(19) **United States**

(12) **Patent Application Publication**

KIMURA et al.

(10) **Pub. No.: US 2013/0186961 A1**

(43) **Pub. Date: Jul. 25, 2013**

(54) **WIRELESS COMMUNICATION DEVICE**

(71) Applicant: **Murata Manufacturing Co., Ltd.**, Nagaokakyo-shi (JP)

(72) Inventors: **Ikuhei KIMURA**, Nagaokakyo-shi (JP); **Nobuo IKEMOTO**, Nagaokakyo-shi (JP)

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

(21) Appl. No.: **13/789,761**

(22) Filed: **Mar. 8, 2013**

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2012/053344, filed on Feb. 14, 2012.

(30) **Foreign Application Priority Data**

Feb. 28, 2011 (JP) 2011-042205

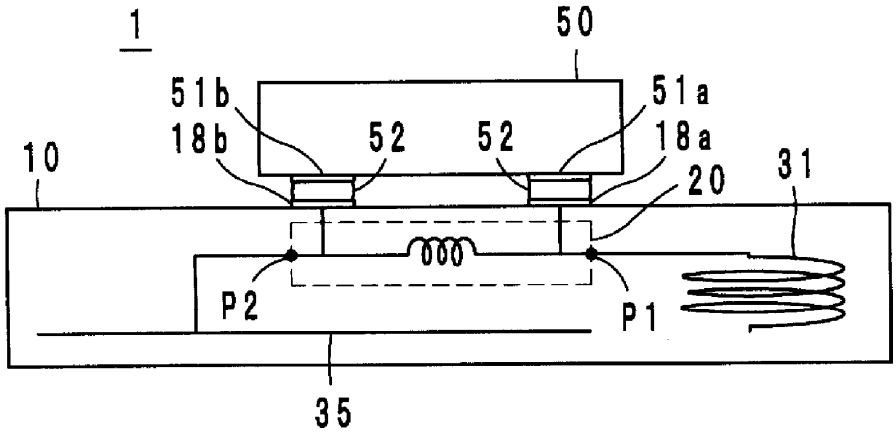
Publication Classification

(51) **Int. Cl.**
G06K 19/077 (2006.01)

(52) **U.S. Cl.**
CPC ***G06K 19/07786*** (2013.01)
USPC **235/492**

(57) **ABSTRACT**

A wireless communication device includes a wireless IC chip that processes a high-frequency signal and a feeding substrate including a coil conductor, a plane conductor, and a matching circuit that is connected to the wireless IC chip and that has a predetermined resonant frequency. The coil conductor and the plane conductor are connected to the matching circuit. The wireless communication device, when used by itself, operates as a monopole antenna in which the plane conductor functions as a ground and the coil conductor functions as a radiation element. When a conductive object is in a vicinity of the plane conductor, the plane conductor is coupled to the conductive object, and the wireless communication device operates as a dipole antenna in which the plane conductor and the conductive object function as a first radiation element and the coil conductor functions as a second radiation element.



US 20130187816A1

(19) **United States**

(12) **Patent Application Publication**

Chung et al.

(10) **Pub. No.: US 2013/0187816 A1**

(43) **Pub. Date: Jul. 25, 2013**

(54) **BAND-NOTCHED ULTRA-WIDEBAND ANTENNA**

(75) Inventors: **Shyh-Jong Chung**, Guanxi Township (TW); **Chao-Tang Chuang**, Fenglin Township (TW)

(73) Assignee: **National Chiao Tung University**, Hsinchu City (TW)

(21) Appl. No.: **13/539,836**

(22) Filed: **Jul. 2, 2012**

(30) **Foreign Application Priority Data**

Jan. 20, 2012 (TW) 101102349

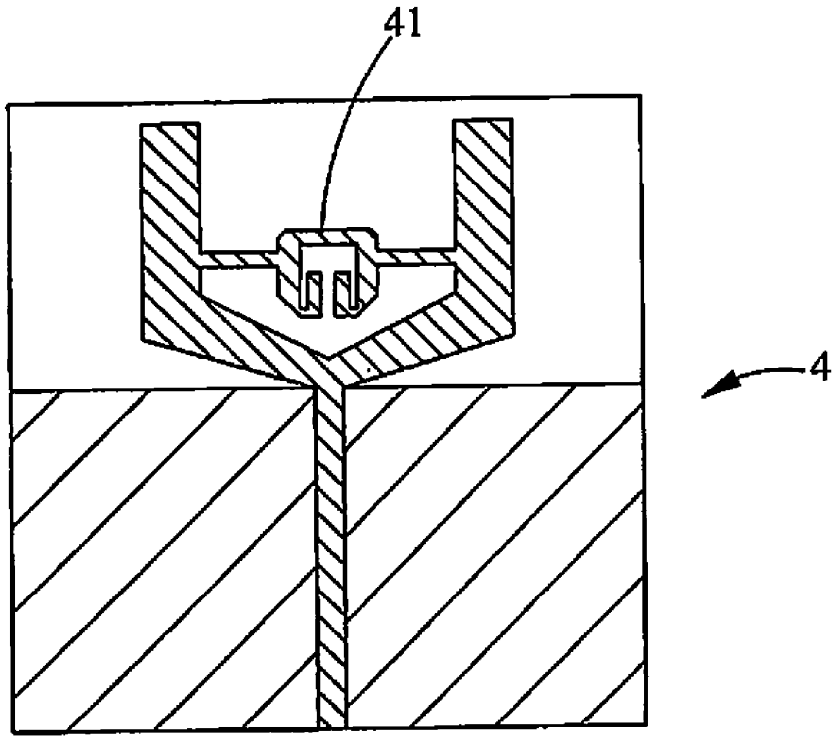
Publication Classification

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

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

(57) **ABSTRACT**

A band-notched ultra-wideband antenna comprises a top layer non-uniform short-circuit metal patch, a middle layer metal radiation patch, and a bottom layer metal patch. The bottom layer metal patch includes a coupled open/short circuit stub which is set close to the middle layer metal radiation patch. The equivalent circuit of the top layer non-uniform short-circuit metal patch is a parallel LC resonator, and the equivalent circuit of the coupled open/short circuit stub is a series LC resonator. The resonant frequency of the top layer non-uniform short-circuit metal patch is equivalent to the resonant frequency of the coupled open/short circuit stub, so as to function as a second-order bandstop filter to yield high notch-band-edge selectivity without increasing total circuit area of the band-notched ultra-wideband antenna.



US 20130187817A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0187817 A1

(43) Pub. Date: Jul. 25, 2013

Jagielski et al.

(54) **DUAL ANTENNA, SINGLE FEED SYSTEM**

(75) Inventors: **Ole Jagielski**, Frederickshavn (DK); **Simon Svendsen**, Aalborg (DK)

(73) Assignee: **Molex Incorporated**, Lisle, IL (US)

(21) Appl. No.: **13/878,647**

(22) PCT Filed: **Oct. 12, 2011**

(86) PCT No.: **PCT/US11/55979**

§ 371 (c)(1),
(2), (4) Date: **Apr. 10, 2013**

Related U.S. Application Data

(60) Provisional application No. 61/392,181, filed on Oct. 12, 2010.

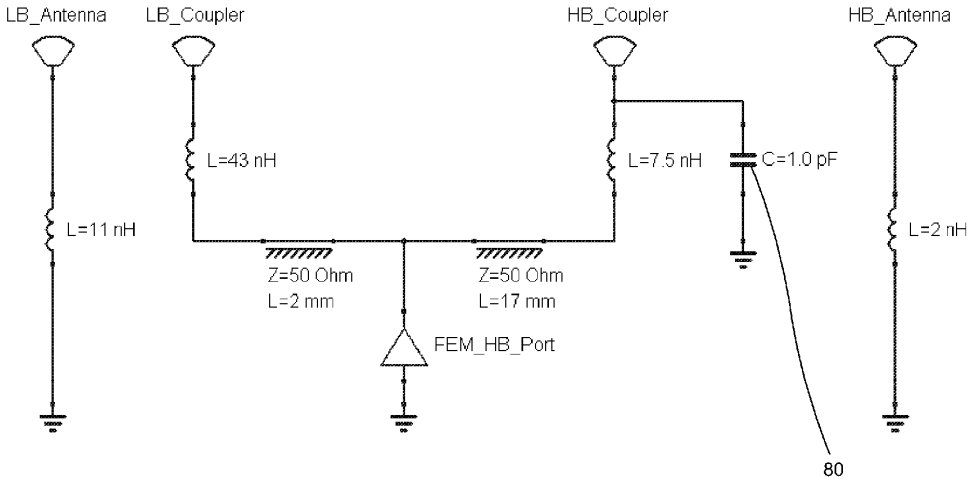
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 21/30*** (2013.01)
USPC **343/751**; 343/852

(57) **ABSTRACT**

An antenna system includes a low-band antenna configured for low-band frequencies and a high-band antenna configured for high-band frequencies. The low-band antenna is configured so that high-band frequencies have a high impedance while the high-band antenna is configured so that low-band frequencies have a high impedance. A transmission line can be used to couple both antennas together and the transmission line can be used to add phase delay to the impedance of the low-band and high-band antennas so that the corresponding frequencies that the antennas are not configured for are shifted toward an infinite impedance point on a Smith chart.



US 20130187819A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0187819 A1

(43) Pub. Date: Jul. 25, 2013

WAKASUGI et al.

(54) **MAGNETIC SHEET AND PRODUCTION METHOD THEREOF, AS WELL AS ANTENNA APPARATUS USING SAME**

(71) Applicant: **PANASONIC CORPORATION**, Osaka (JP)

(72) Inventors: **Shinichi WAKASUGI**, Miyazaki (JP); **Koji Yasumura**, Miyazaki (JP); **Masatoshi Izaki**, Miyazaki (JP)

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

(21) Appl. No.: **13/744,742**

(22) Filed: **Jan. 18, 2013**

(30) **Foreign Application Priority Data**

Jan. 20, 2012 (JP) 2012-009884
Jan. 20, 2012 (JP) 2012-009885
Apr. 26, 2012 (JP) 2012-101106

Publication Classification

(51) **Int. Cl.**

H01F 7/00	(2006.01)
B32B 3/26	(2006.01)
H01F 41/00	(2006.01)
H01Q 7/06	(2006.01)

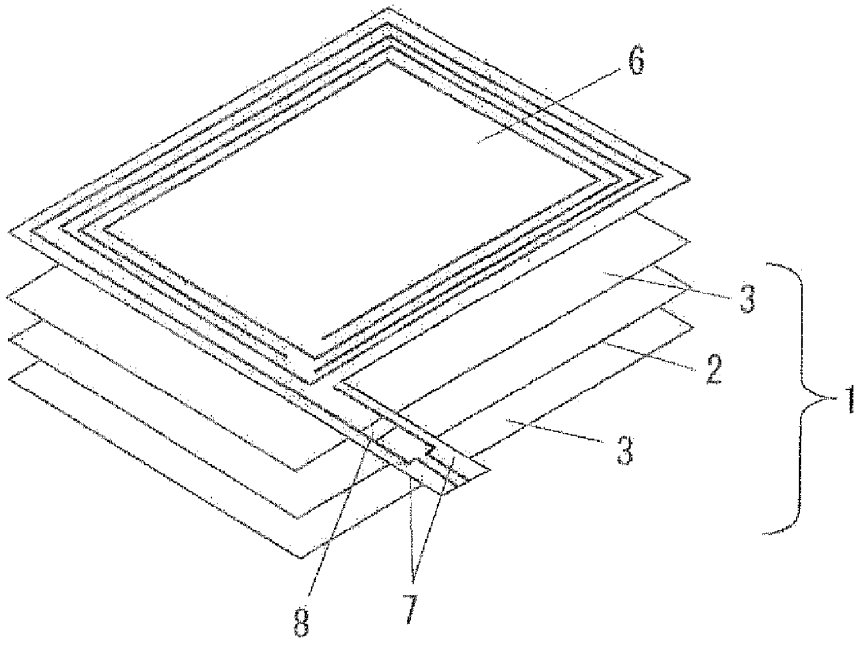
(52) **U.S. Cl.**

CPC .. ***H01F 7/00*** (2013.01); ***H01Q 7/06*** (2013.01); ***B32B 3/266*** (2013.01); ***H01F 41/00*** (2013.01)

USPC **343/787**; 428/137; 428/134; 29/592

(57) **ABSTRACT**

A magnetic sheet that is omnidirectionally flexible, particularly one that is thin, reliably divided into small fragments and has flexibility, is fired in a planar shape. A magnetic sheet of the claimed invention includes: a magnetic body; a protective member provided on at least one face of the magnetic body; and a plurality of holes provided in at least one face of the magnetic body. The magnetic body is divided into a plurality of small fragments using the plurality of holes. The plurality of small fragments vary in shape.



US 20130187820A1

(19) **United States**

(12) **Patent Application Publication**

Ng et al.

(10) **Pub. No.: US 2013/0187820 A1**

(43) **Pub. Date: Jul. 25, 2013**

(54) **MULTI-BAND, WIDE-BAND ANTENNAS**

(75) Inventors: **Kok Jiunn Ng**, Butterworth (MY); **Kean Meng Lim**, Sungai Petani (MY)

(73) Assignee: **Laird Technologies, Inc**, Chesterfiled, MO (US)

(21) Appl. No.: **13/877,715**

(22) PCT Filed: **Oct. 5, 2010**

(86) PCT No.: **PCT/MY10/00200**

§ 371 (c)(1),
(2), (4) Date: **Apr. 4, 2013**

Publication Classification

(51) **Int. Cl.**

H01Q 5/02	(2006.01)
H01Q 5/00	(2006.01)
H01Q 9/28	(2006.01)

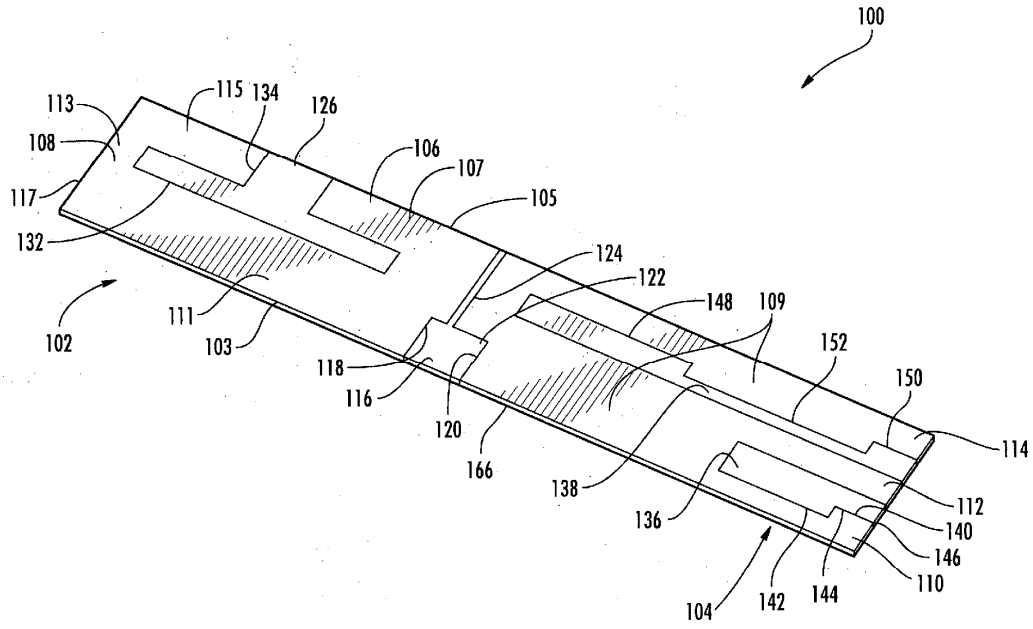
(52) **U.S. Cl.**

CPC ***H01Q 5/02*** (2013.01); ***H01Q 9/285*** (2013.01); ***H01Q 5/0017*** (2013.01)

USPC **343/793**

(57) **ABSTRACT**

Disclosed herein are various exemplary embodiments of multi-band, wide- band antennas. In exemplary embodiments, the antenna generally includes an upper portion and a lower portion. The upper portion includes two or more upper radiating elements and one or more slots disposed between the two or more upper radiating elements. The lower portion includes three or more lower radiating elements and one or more slots disposed between the three or more lower radiating elements. A gap is between the upper and lower portions such that the upper radiating elements are separated and spaced apart from the lower radiating elements. The antenna may be configured such that coupling of the gap and the upper and lower radiating elements enable multi-band, wide-band operation of the antenna within at least a first frequency range and a second frequency range, with the upper radiating elements operable as a radiating portion of the antenna, the lower radiating elements operable as a ground portion, and the gap operable for impedance matching.



US 20130187821A1

(19) **United States**

(12) **Patent Application Publication**

Lecam et al.

(10) **Pub. No.: US 2013/0187821 A1**

(43) **Pub. Date: Jul. 25, 2013**

(54) **DUAL-POLARIZATION RADIATING ELEMENT OF A MULTIBAND ANTENNA**

(75) Inventors: **Patrick Lecam**, Lannion (FR); **Jean-Pierre Harel**, Lannion (FR); **Aurélien Hilary**, Lannion (FR)

(73) Assignee: **ALCATEL LUCENT**, Paris (FR)

(21) Appl. No.: **13/700,306**

(22) PCT Filed: **May 26, 2011**

(86) PCT No.: **PCT/EP11/58684**

§ 371 (c)(1), (2), (4) Date: **Mar. 27, 2013**

(30) **Foreign Application Priority Data**

May 28, 2010 (FR) 1054150

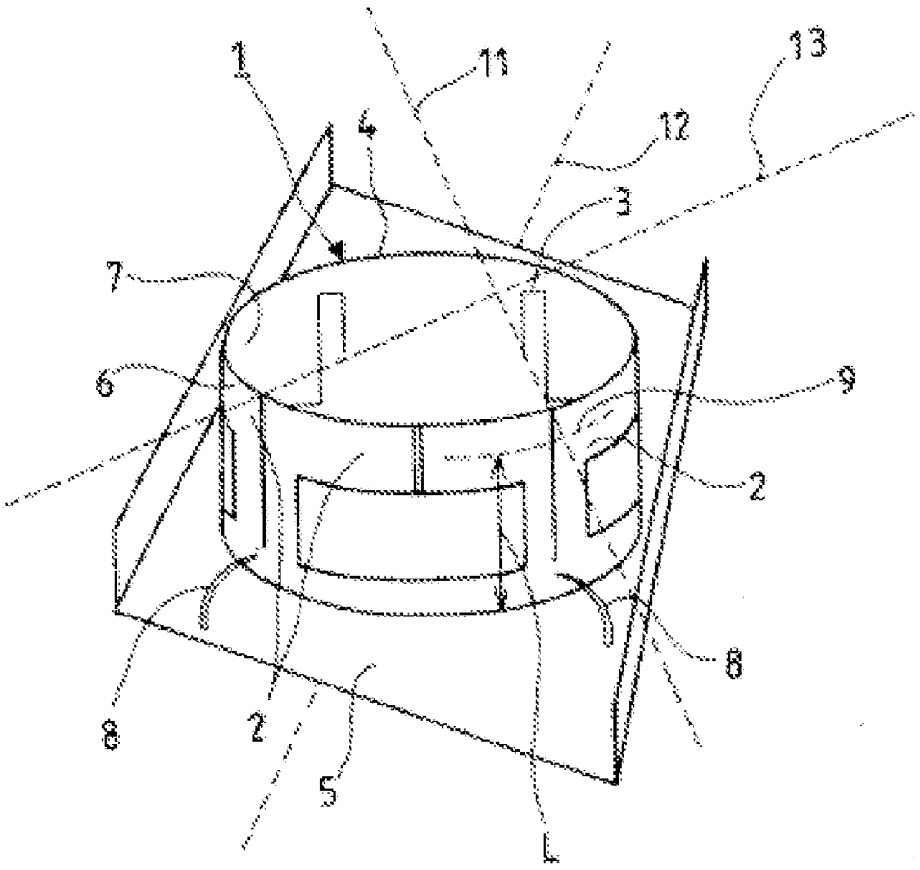
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 21/28*** (2013.01)
USPC **343/799**

(57) **ABSTRACT**

A dual-polarization radiating element for a multiband antenna comprises a support with a high dielectric constant whose shape is roughly cylindrical, having an axis of revolution, at least a first and a second pair of dipoles printed on a first surface of the support, the dipoles of the first pair being roughly orthogonal to the dipoles of the second pair, and conductive lines, to feed each dipole, printed onto a second surface of the support. The support is placed on a flat reflector, with the cylindrical support's axis of revolution being perpendicular to the plane of the reflector.



US 20130187823A1

(19) **United States**

(12) **Patent Application Publication**

Lo Hine Tong et al.

(10) **Pub. No.: US 2013/0187823 A1**

(43) **Pub. Date: Jul. 25, 2013**

(54) **ISOLATION OF ANTENNAS MOUNTED ON A PRINTED CIRCUIT BOARD**

(71) Applicant: **Thomson Licensing**, Issy de Moulineaux (FR)

(72) Inventors: **Dominique Lo Hine Tong**, Cesson Sevigne (FR); **Philippe Minard**, Cesson Sevigne (FR); **Jean-Luc Robert**, Cesson Sevigne (FR)

(73) Assignee: **Thomson Licensing**, Issy de Moulineaux (FR)

(21) Appl. No.: **13/744,495**

(22) Filed: **Jan. 18, 2013**

(30) **Foreign Application Priority Data**

Jan. 20, 2012 (FR) 1250571

Publication Classification

(51) **Int. Cl.**

H01Q 21/28 (2006.01)

H01Q 1/52 (2006.01)

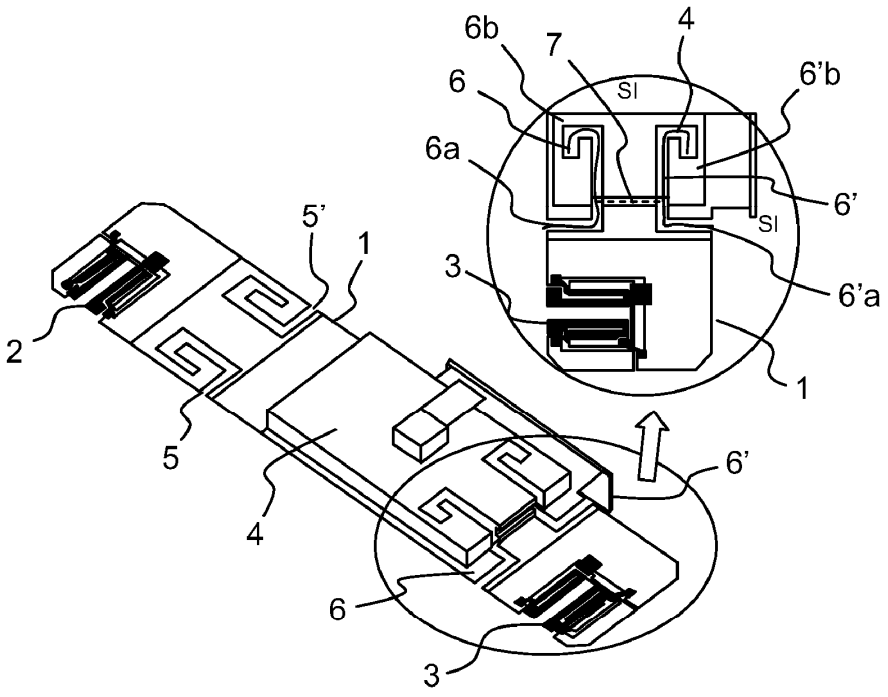
(52) **U.S. Cl.**

CPC ***H01Q 21/28*** (2013.01); ***H01Q 1/521*** (2013.01); ***H01Q 1/526*** (2013.01)

USPC **343/841**

(57) **ABSTRACT**

The present invention relates to a circuit comprising on a same board at least one antenna, a processing circuit and a cover covering the processing circuit. Said circuit comprises between the antenna and the cover at least one isolation element realized partly on the board and partly on the cover.



US 20130187824A1

(19) **United States**

(12) **Patent Application Publication**

KATO et al.

(10) **Pub. No.: US 2013/0187824 A1**

(43) **Pub. Date: Jul. 25, 2013**

(54) **IMPEDANCE CONVERTING CIRCUIT AND COMMUNICATION TERMINAL APPARATUS**

(71) Applicant: **Murata Manufacturing Co., Ltd.**, Nagaokakyo-shi (JP)

(72) Inventors: **Noburo KATO**, Nagaokakyo-shi (JP); **Kenichi ISHIZUKA**, Nagaokakyo-shi (JP); **Noriyuki UEKI**, Nagaokakyo-shi (JP)

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

(21) Appl. No.: **13/792,469**

(22) Filed: **Mar. 11, 2013**

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2012/053747, filed on Feb. 17, 2012.

(30) **Foreign Application Priority Data**

Feb. 23, 2011 (JP) 2011-037681
Jun. 22, 2011 (JP) 2011-137927

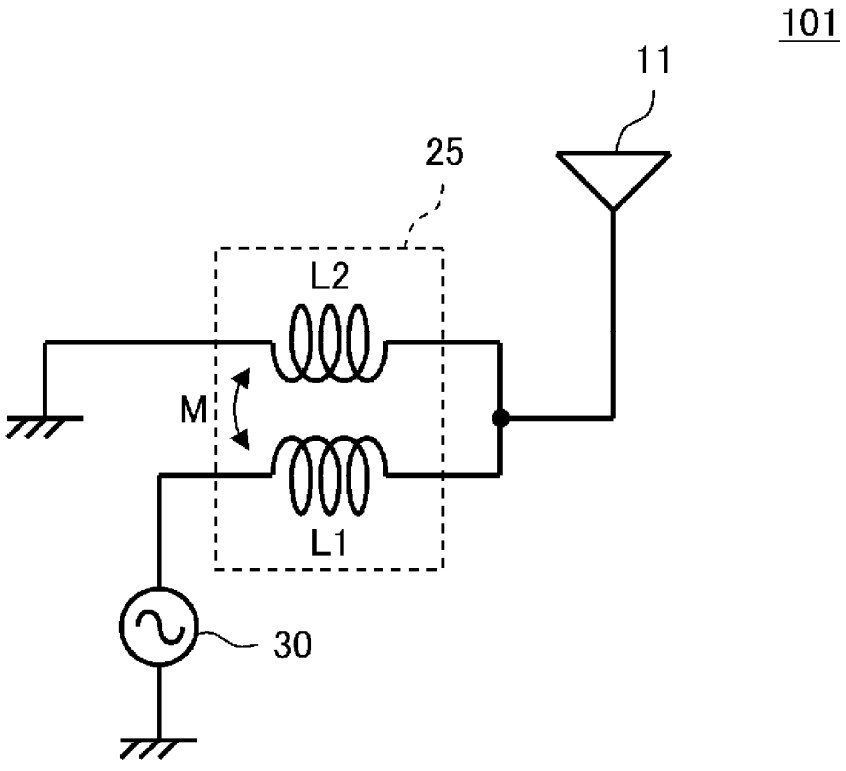
Publication Classification

(51) **Int. Cl.**
H03H 7/38 (2006.01)
H01Q 1/50 (2006.01)

(52) **U.S. Cl.**
CPC .. ***H03H 7/38*** (2013.01); ***H01Q 1/50*** (2013.01)
USPC **343/852**; 333/32

(57) **ABSTRACT**

An impedance converting circuit module includes a first matching circuit, a feeding-circuit-side matching circuit interposed between the first matching circuit and a feeding circuit, and an antenna-side matching circuit interposed between the first matching circuit and a radiating element. The feeding-circuit-side matching circuit performs impedance matching between a feeding port of the feeding circuit and the first matching circuit, and the antenna-side matching circuit performs impedance matching between a port of the radiating element and the first matching circuit.



US 20130187827A1

(19) **United States**

(12) **Patent Application Publication**

Puente Baliarda et al.

(10) **Pub. No.: US 2013/0187827 A1**

(43) **Pub. Date: Jul. 25, 2013**

(54) **MULTILEVEL ANTENNAE**

(71) Applicant: **Fractus, S.A.**, Barcelona (ES)

(72) Inventors: **Carles Puente Baliarda**, Sant Cugat del Valles (ES); **Carmen Borja Borau**, Barcelona (ES); **Jaume Anguera Pros**, Vinaros (ES); **Jordi Soler Castany**, Mataro (ES)

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

(21) Appl. No.: **13/732,750**

(22) Filed: **Jan. 2, 2013**

Related U.S. Application Data

(63) Continuation of application No. 13/669,916, filed on Nov. 6, 2012, now abandoned, which is a continuation of application No. 13/411,212, filed on Mar. 2, 2012, now Pat. No. 8,330,659, which is a continuation of application No. 13/044,189, filed on Mar. 9, 2011, now Pat. No. 8,154,463, which is a continuation of application No. 12/400,888, filed on Mar. 10, 2009, now Pat. No. 8,009,111, which is a continuation of application No. 11/780,932, filed on Jul. 20, 2007, now Pat. No. 7,528,782, which is a continuation of application No. 11/179,257, filed on Jul. 12, 2005, now Pat. No. 7,397,431, which is a continuation of application No. 11/102,390, filed on Apr. 8, 2005, now Pat. No. 7,123,208, which is a continuation of application No. 10/963,080, filed on Oct. 12, 2004, now Pat. No. 7,015,868, which is a continuation of application No. 10/102,568, filed on Mar. 18, 2002, now abandoned, which is a continuation of application No. PCT/ES99/00296, filed on Sep. 20, 1999.

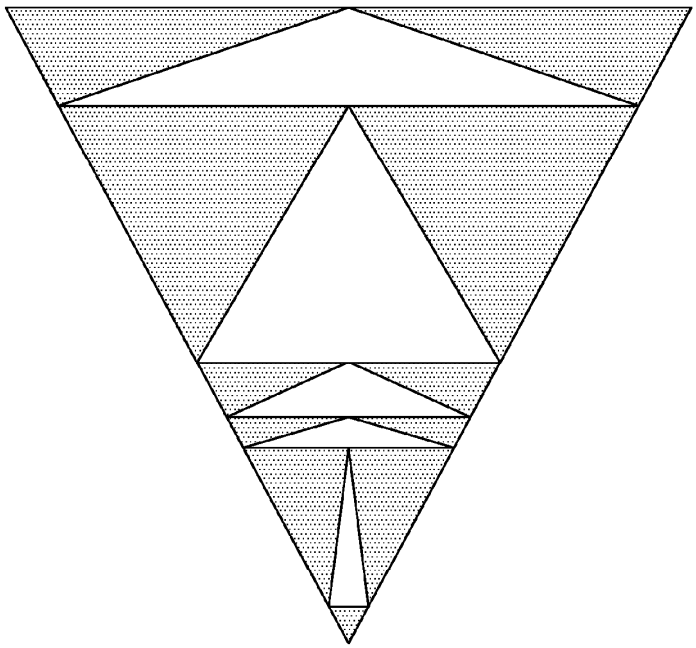
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 5/001*** (2013.01)
USPC ..... **343/860**; 343/700 MS

(57) **ABSTRACT**

An apparatus includes a multi-band antenna element that operates in at least three frequency bands and includes geometric elements arranged to define empty spaces in the antenna element to provide at least three winding current paths through the antenna element which circumvent the empty spaces, the at least three winding current paths respectively corresponding to the at least three frequency bands, wherein each of two or more of the geometric elements is traversed by more than one of the at least three respective winding current paths. The antenna element provides a substantially similar impedance level and radiation pattern in the at least three frequency bands. The geometric elements are arranged such that the antenna element does not comprise substantially non-overlapping portions that serve as respective single band antennas, and a geometry of the antenna element is not substantially self-repeating.



US 20130189928A1

(19) **United States**

(12) **Patent Application Publication**

Desclos et al.

(10) **Pub. No.: US 2013/0189928 A1**

(43) **Pub. Date: Jul. 25, 2013**

(54) **MODAL COGNITIVE DIVERSITY FOR MOBILE COMMUNICATION MIMO SYSTEMS**

(71) Applicants: **Laurent Desclos**, San Diego, CA (US); **Sebastian Rowson**, San Diego, CA (US); **Jeffrey Shamblin**, San Marcos, CA (US); **Olivier Pajona**, Antibes (FR)

(72) Inventors: **Laurent Desclos**, San Diego, CA (US); **Sebastian Rowson**, San Diego, CA (US); **Jeffrey Shamblin**, San Marcos, CA (US); **Olivier Pajona**, Antibes (FR)

(21) Appl. No.: **13/749,627**

(22) Filed: **Jan. 24, 2013**

Related U.S. Application Data

(60) Provisional application No. 61/590,317, filed on Jan. 24, 2012, provisional application No. 61/609,222, filed on Mar. 9, 2012.

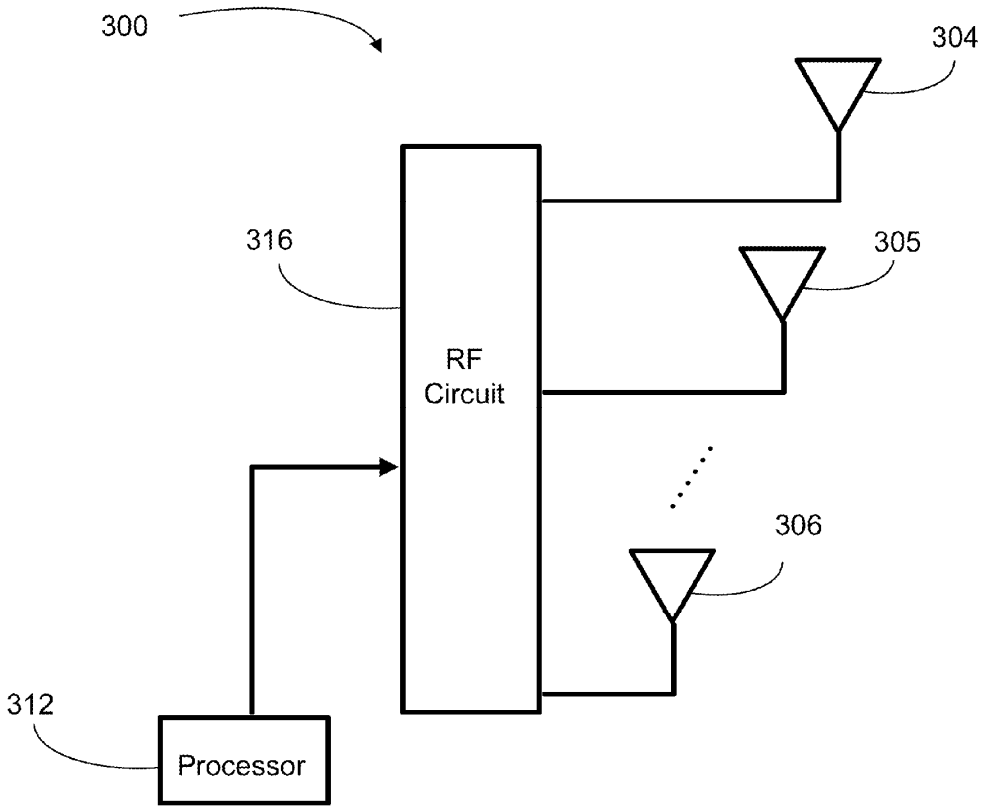
Publication Classification

(51) **Int. Cl.**
H04B 7/04 (2006.01)

(52) **U.S. Cl.**
CPC ***H04B 7/0413*** (2013.01)
USPC **455/63.4**

(57) **ABSTRACT**

A system and method for optimizing the performance for MIMO are provided, the system including multiple antennas, including at least one modal antenna, wherein each of the at least one modal antenna has multiple modes corresponding to multiple radiation patterns, and a processor coupled to the multiple antennas and configured to select a mode among the multiple modes to optimize signal quality for each time interval based on a CQI by considering envelop correlation effects.



US 20130189934A1

(19) **United States**

(12) **Patent Application Publication**

Hung et al.

(10) **Pub. No.: US 2013/0189934 A1**

(43) **Pub. Date: Jul. 25, 2013**

(54) **RADIO-FREQUENCY DEVICE, WIRELESS COMMUNICATION DEVICE AND METHOD FOR ENHANCING ANTENNA ISOLATION**

(76) Inventors: **Tso-Ming Hung**, Hsinchu (TW); **Jhih-Yuan Ke**, Hsinchu (TW); **Chih-Sen Hsieh**, Hsinchu (TW); **Ming-Feng Chang**, Hsinchu (TW); **Chih-Ming Wang**, Hsinchu (TW)

(21) Appl. No.: **13/421,874**

(22) Filed: **Mar. 16, 2012**

(30) **Foreign Application Priority Data**

Jan. 20, 2012 (TW) 101102630

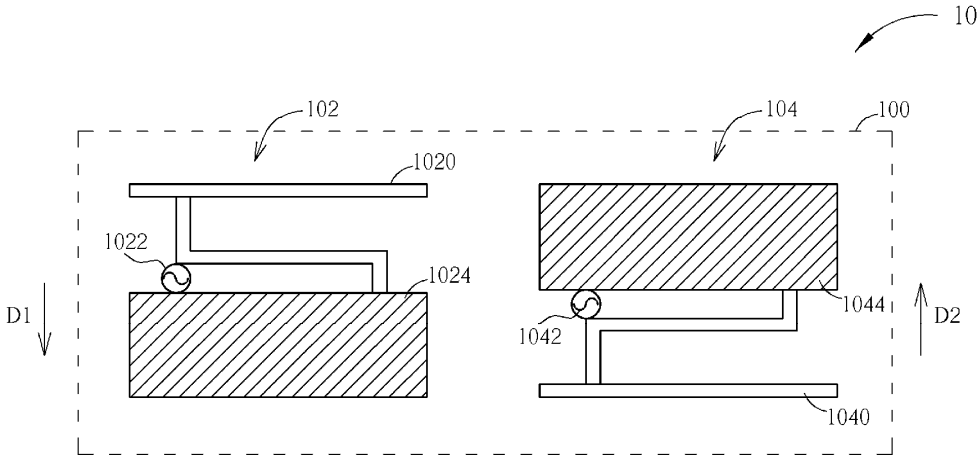
Publication Classification

(51) **Int. Cl.**
H04B 1/56 (2006.01)

(52) **U.S. Cl.**
USPC **455/90.2**

(57) **ABSTRACT**

A radio-frequency (RF) device for a wireless communication device includes an antenna disposition area, and a plurality of antennas of a same type, formed in the antenna disposition area by different arrangements, for receiving or transmitting a plurality of wireless signals of a same frequency band.



US 20130194136A1

(19) **United States**

(12) **Patent Application Publication**

HANDRO et al.

(10) **Pub. No.: US 2013/0194136 A1**

(43) **Pub. Date: Aug. 1, 2013**

(54) **MOBILE WIRELESS COMMUNICATIONS DEVICE WITH MULTIPLE-BAND ANTENNA AND RELATED METHODS**

(75) Inventors: **Andreas HANDRO**, Munster (DE); **Christopher Wehrmann**, Bochum (DE); **Michael Kühn**, Bochum (DE)

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

(21) Appl. No.: **13/359,918**

(22) Filed: **Jan. 27, 2012**

Publication Classification

(51) **Int. Cl.**

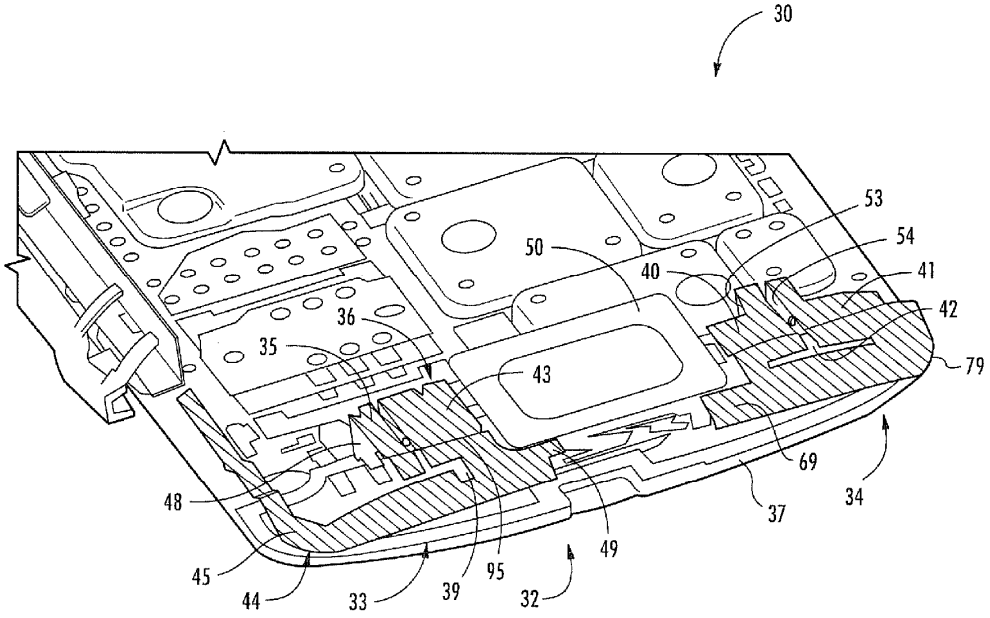
H01Q 1/24	(2006.01)
H01P 11/00	(2006.01)
H01Q 5/00	(2006.01)

(52) **U.S. Cl.**

USPC ..... **343/702**; 343/700 MS; 29/601

(57) **ABSTRACT**

A mobile wireless communications device may include a housing, a wireless transceiver carried by the housing, and a multiple-band antenna carried by the housing and coupled to the wireless transceiver. The multiple-band antenna may include a first radiator comprising a radiator element and a parasitic element adjacent to the radiator element. The parasitic element may be selectively switchable between floating and grounded states. The multiple-band antenna may include a second radiator insulated from the first radiator.



US 20130194138A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0194138 A1

(43) Pub. Date: Aug. 1, 2013

Hammond

(54) **MOBILE WIRELESS COMMUNICATIONS DEVICE INCLUDING ELECTRICALLY CONDUCTIVE PORTABLE HOUSING SECTIONS DEFINING AN ANTENNA**

(75) Inventor: **Robert Ralph Bryan Hammond**, Ottawa (CA)

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

(21) Appl. No.: **13/360,197**

(22) Filed: **Jan. 27, 2012**

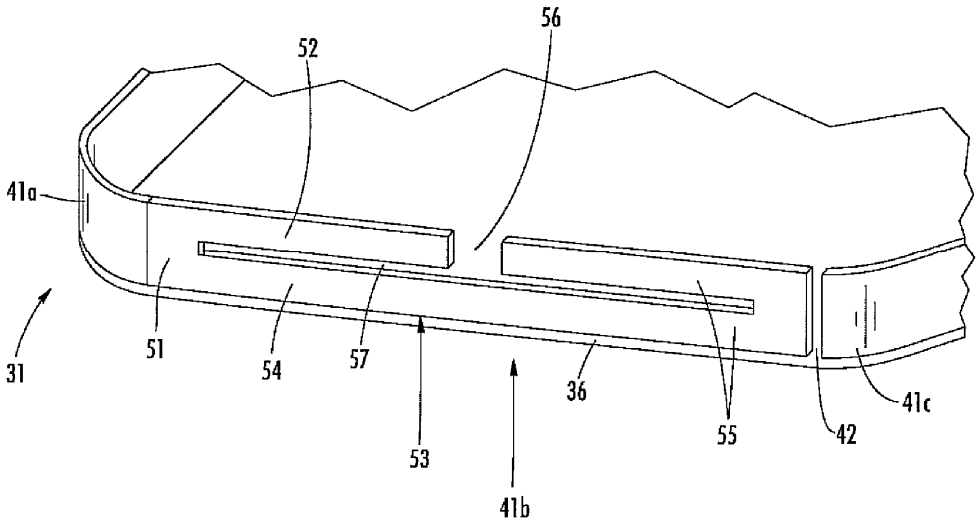
Publication Classification

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

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

(57) **ABSTRACT**

A mobile wireless communications device may include a portable housing including electrically conductive sections defining a perimeter of the portable housing and configured to function as an antenna. One of the electrically conductive sections may include a base, a first electrically conductive arm extending from the base, and a second electrically conductive arm having a proximal portion parallel and spaced apart from the first electrically conductive arm. A printed circuit board (PCB) may be carried by the portable housing. The mobile wireless communications device may also include wireless transceiver circuitry carried by the PCB and coupled to the antenna.



US 20130194141A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0194141 A1

(43) Pub. Date: Aug. 1, 2013

Okajima et al.

(54) EYEGLASSES-TYPE WIRELESS COMMUNICATIONS APPARATUS

(75) Inventors: **Yusuke Okajima**, Osaka-shi (JP); **Tomofumi Katayama**, Osaka-shi (JP)

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

(21) Appl. No.: **13/876,385**

(22) PCT Filed: **Dec. 20, 2011**

(86) PCT No.: **PCT/JP2011/079437**

§ 371 (c)(1),
(2), (4) Date: **Mar. 27, 2013**

(30) **Foreign Application Priority Data**

Dec. 22, 2010 (JP) 2010-286381

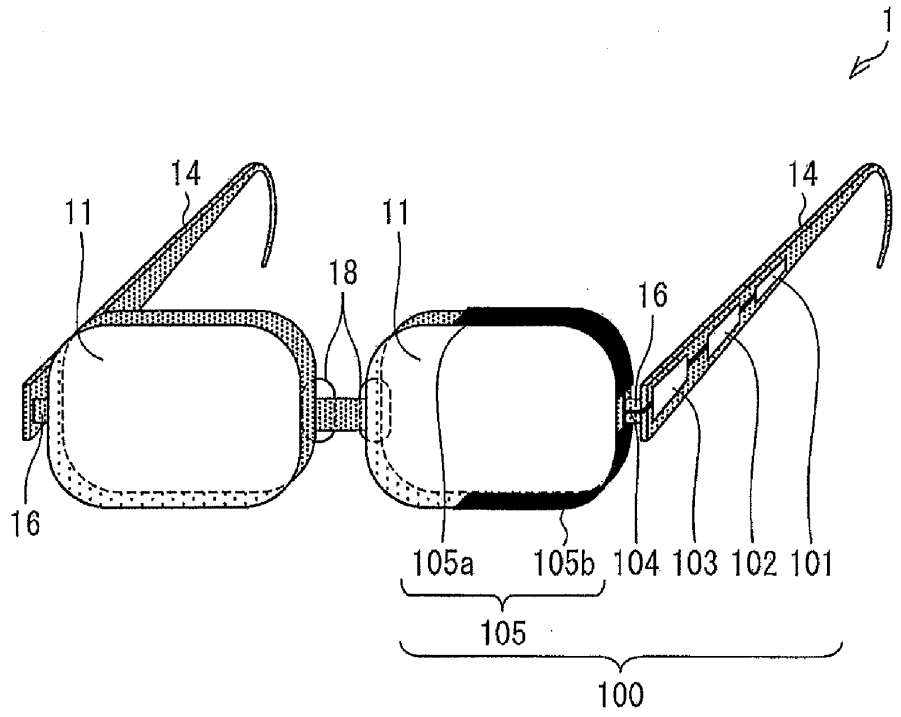
Publication Classification

(51) **Int. Cl.**
H01Q 1/27 (2006.01)

(52) **U.S. Cl.**
CPC *H01Q 1/273* (2013.01)
USPC **343/718**

(57) **ABSTRACT**

An eyeglasses-type wireless communications device includes: left and right eyepiece sections; pads; endpieces; temples; and an antenna element for carrying out wireless communications, and the antenna element is disposed in a region along an outer edge(s) of the right eyepiece section and/or the left eyepiece section, the region including corresponding one(s) of the endpieces but excluding connecting parts of the eyepiece sections which parts are connected to the respectively corresponding pads.



US 20130194146A1

(19) **United States**

(12) **Patent Application Publication**

LEE et al.

(10) **Pub. No.: US 2013/0194146 A1**

(43) **Pub. Date: Aug. 1, 2013**

(54) **ANTENNA HAVING BROAD BANDWIDTH AND HIGH RADIATION EFFICIENCY**

(71) Applicants: **Jae Sup LEE**, Yongin-si (KR); **Seong Joong KIM**, Suwon-si (KR); **Sang Wook NAM**, Seoul (KR); **Su Min YUN**, Incheon (KR)

(72) Inventors: **Jae Sup LEE**, Yongin-si (KR); **Seong Joong KIM**, Suwon-si (KR); **Sang Wook NAM**, Seoul (KR); **Su Min YUN**, Incheon (KR)

(73) Assignees: **SNU R&DB Foundation**, Seoul (KR); **Samsung Electronics Co., Ltd.**, Suwon-si (KR)

(21) Appl. No.: **13/680,313**

(22) Filed: **Nov. 19, 2012**

(30) **Foreign Application Priority Data**

Jan. 26, 2012 (KR) 10-2012-0007886

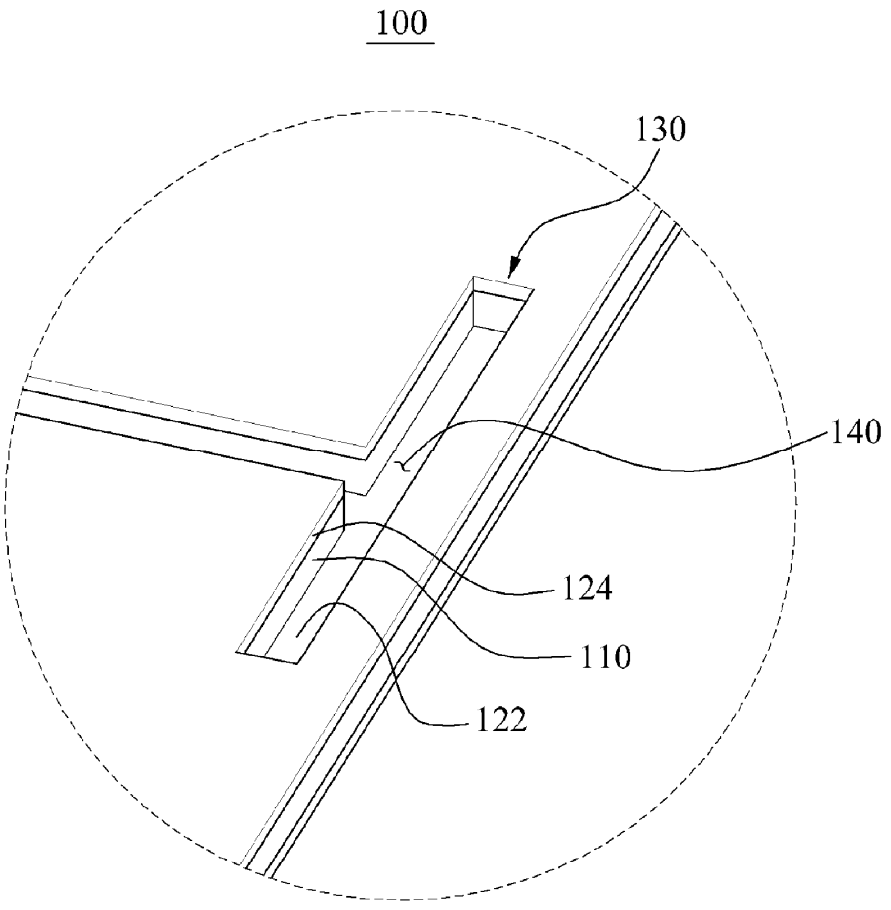
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 13/106*** (2013.01)
USPC **343/767**

(57) **ABSTRACT**

An antenna having a broad bandwidth and a high radiation efficiency is provided. The antenna includes a conductor, and a dielectric substrate disposed on the conductor. The antenna further includes a slot portion formed on the dielectric substrate, and a cavity formed in the dielectric substrate that corresponds to the slot portion.



US 20130194149A1

(19) **United States**

(12) **Patent Application Publication**

KIMURA et al.

(10) **Pub. No.: US 2013/0194149 A1**

(43) **Pub. Date: Aug. 1, 2013**

(54) **WIRELESS COMMUNICATION DEVICE**

(71) Applicant: **Murata Manufacturing Co., Ltd.**, Nagaokakyo-shi (JP)

(72) Inventors: **Ikuhei KIMURA**, Nagaokakyo-shi (JP); **Nobuo IKEMOTO**, Nagaokakyo-shi (JP)

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

(21) Appl. No.: **13/795,367**

(22) Filed: **Mar. 12, 2013**

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2011/078263, filed on Dec. 7, 2011.

(30) **Foreign Application Priority Data**

Jan. 5, 2011 (JP) 2011-000694

Publication Classification

(51) **Int. Cl.**

H01Q 9/16 (2006.01)
H01Q 9/06 (2006.01)
H01Q 1/50 (2006.01)

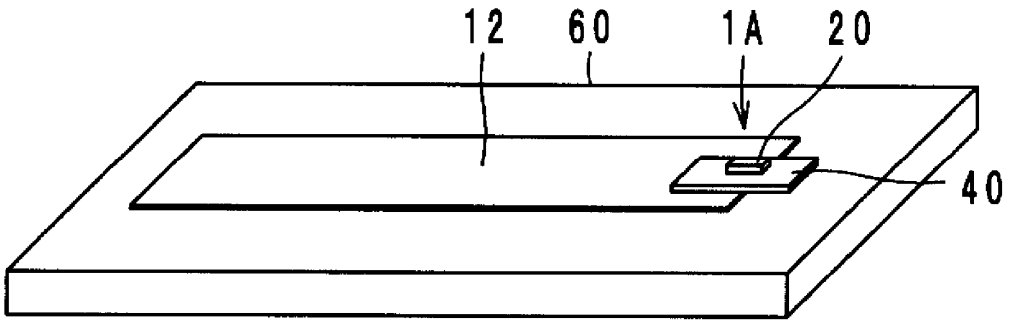
(52) **U.S. Cl.**

CPC . ***H01Q 9/16*** (2013.01); ***H01Q 1/50*** (2013.01); ***H01Q 9/065*** (2013.01)

USPC **343/803**; 343/793; 343/822; 343/820

(57) **ABSTRACT**

A compact wireless communication includes a first radiating element and a second radiating element, which define and function as a dipole antenna, a feeder circuit including a wireless IC chip coupled with the first and second radiating elements, and a feeder substrate that is provided with the wireless IC chip. The first radiating element is provided to the feeder substrate. The second radiating element is provided to a substrate other than the feeder substrate.



US 20130194150A1

(19) **United States**

(12) **Patent Application Publication**

Korva

(10) **Pub. No.: US 2013/0194150 A1**

(43) **Pub. Date: Aug. 1, 2013**

(54) **ANTENNA OF A LAPTOP DEVICE AND METHODS**

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

(21) Appl. No.: **13/697,343**

(22) PCT Filed: **May 11, 2011**

(86) PCT No.: **PCT/FI2011/050434**

§ 371 (c)(1),
(2), (4) Date: **Mar. 8, 2013**

(30) **Foreign Application Priority Data**

May 12, 2010 (FI) 20105519

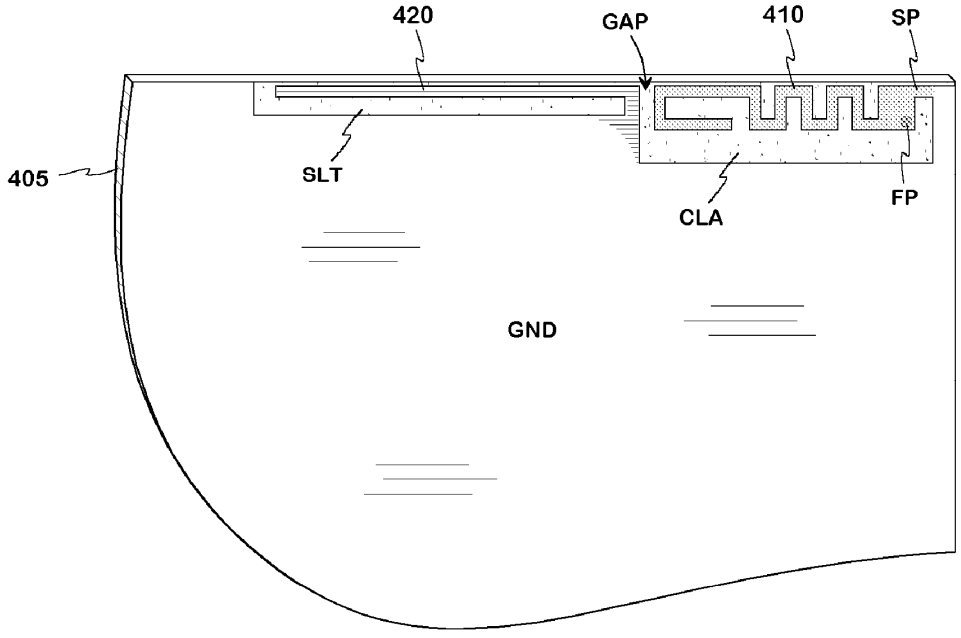
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 1/48*** (2013.01)
USPC **343/848**

(57) **ABSTRACT**

An antenna of a laptop device, which can be connected wirelessly to a communication network. The apparent size of the antenna's ground plane (GND), as 'seen' from the feed of the monopole radiator (**410**), is reduced so that the outer peak of the strength of the electric field in the near field of the ground plane falls about at the distance of a quarter wavelength from the outer end of the radiator at the frequencies in the lower operating band of the antenna. This is implemented by arranging a quarter wave resonator (**420**, GND) tied to the ground plane so that the short-circuited end of this resonator is close to the outer end of the radiator. The capability of the antenna at the frequencies below 1 GHz improves because of the more favourable distribution of the field of the ground plane.



US 20130194156A1

(19) **United States**

(12) **Patent Application Publication**

Iellici

(10) **Pub. No.: US 2013/0194156 A1**

(43) **Pub. Date: Aug. 1, 2013**

(54) **LTE ANTENNA PAIR FOR MIMO/DIVERSITY OPERATION IN THE LTE/GSM BANDS**

(75) Inventor: **Devis Iellici**, Cambridge (GB)

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

(21) Appl. No.: **13/878,976**

(22) PCT Filed: **Oct. 5, 2011**

(86) PCT No.: **PCT/GB11/51897**

§ 371 (c)(1),
(2), (4) Date: **Apr. 11, 2013**

(30) **Foreign Application Priority Data**

Oct. 15, 2010 (GB) 1017481.1

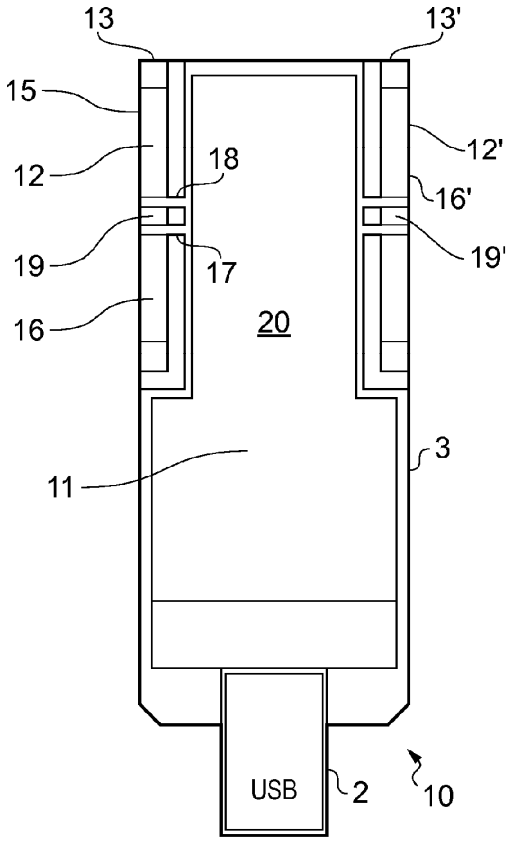
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 7/00*** (2013.01)
USPC **343/867**

(57) **ABSTRACT**

There is disclosed a multiple-input multiple-output (MIMO) antenna system comprising first and second folded or compacted loop antennas (**12**, **121**). The antennas each have a longitudinal extent and are mounted substantially parallel to each other on a dielectric substrate (**3**) having a conductive groundplane (**31**, **32**). The groundplane extends between the first and second antennas, and the first and second antennas are mounted on the substrate in areas where there is no groundplane. The first and second antennas, in use, generate first and second radiation patterns (**31**, **32**) and also cause currents (**30**) to flow in the groundplane between the antennas so as to skew the first and second radiation patterns relative to each other by an angle greater than zero, and preferably at an angle of around 50 degrees.



US 20130196722A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0196722 A1

(43) Pub. Date: Aug. 1, 2013

WONG et al.

(54) **MOBILE WIRELESS COMMUNICATIONS DEVICE HAVING FREQUENCY SELECTIVE GROUNDING AND RELATED METHOD**

(71) Applicant: **RESEARCH IN MOTION LIMITED**, Waterloo (CA)

(72) Inventors: **JOSHUA KWAN HO WONG**, WATERLOO (CA); **ADRIAN MATTHEW COOKE**, KITCHENER (CA)

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

(21) Appl. No.: **13/799,322**

(22) Filed: **Mar. 13, 2013**

Related U.S. Application Data

(63) Continuation of application No. 13/442,968, filed on Apr. 10, 2012, now Pat. No. 8,417,300, which is a continuation of application No. 12/868,763, filed on Aug. 26, 2010, now Pat. No. 8,180,412.

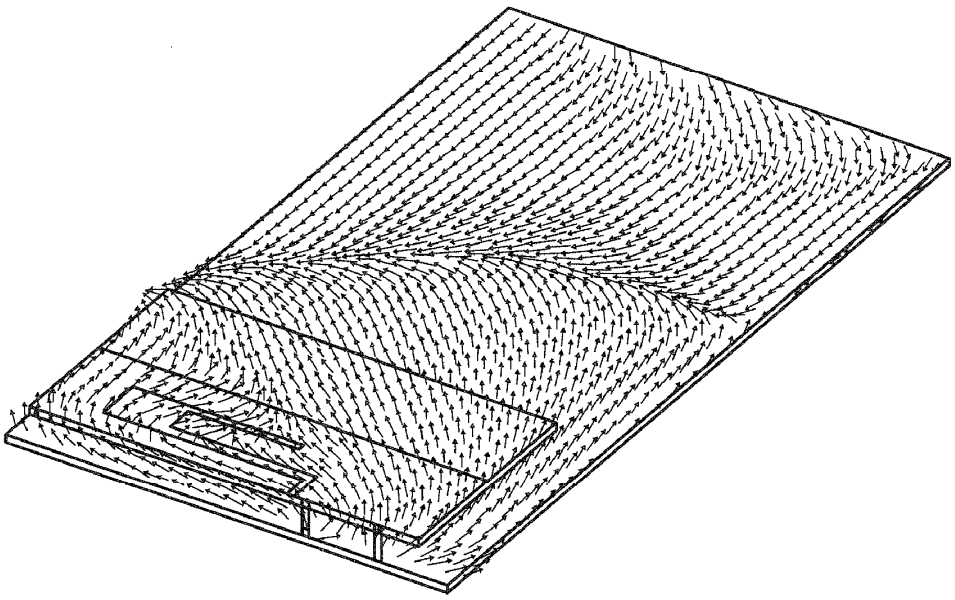
Publication Classification

(51) **Int. Cl.**
H04M 1/02 (2006.01)

(52) **U.S. Cl.**
CPC *H04M 1/0277* (2013.01)
USPC **455/575.2**; 29/831

(57) **ABSTRACT**

A mobile wireless communications device includes a portable housing having a metallic front housing forming a peripheral sidewall as a metallic ring. A circuit board is carried by the portable housing and forms a chassis ground plane. A wireless communications circuit is carried by a circuit board. An antenna circuit is carried by a circuit board and connected to the wireless communications circuit. A frequency selective grounding circuit is positioned at a selected grounding location at the chassis ground plane and metallic front housing and forms a harmonic trap that responds to a specific range of frequencies.



US 20130201062A1

(19) **United States**

(12) **Patent Application Publication**

LIN et al.

(10) **Pub. No.: US 2013/0201062 A1**

(43) **Pub. Date: Aug. 8, 2013**

(54) **THREE-DIMENSIONAL ANTENNA AND A WIRELESS COMMUNICATION APPARATUS PROVIDED WITH THE SAME**

(71) Applicant: **C/O WISTRON NEWEB CORP**, New Tapei City (TW)

(72) Inventors: **CHIA-HONG LIN**, NEW TAIPEI CITY (TW); **JUI-HSIANG CHOU**, NEW TAIPEI CITY (TW); **CHANG-HSIU HUANG**, NEW TAIPEI CITY (TW); **SHIH-HONG CHEN**, NEW TAIPEI CITY (TW); **YI-CHENG WU**, NEW TAIPEI CITY (TW)

(73) Assignee: **C/O WISTRON NEWEB CORP**, NEW TAIPEI CITY (TW)

(21) Appl. No.: **13/677,356**

(22) Filed: **Nov. 15, 2012**

(30) **Foreign Application Priority Data**

Feb. 8, 2012 (TW) 101104059

Publication Classification

(51) **Int. Cl.**

H01Q 1/36 (2006.01)
H01Q 1/24 (2006.01)
H01Q 1/48 (2006.01)

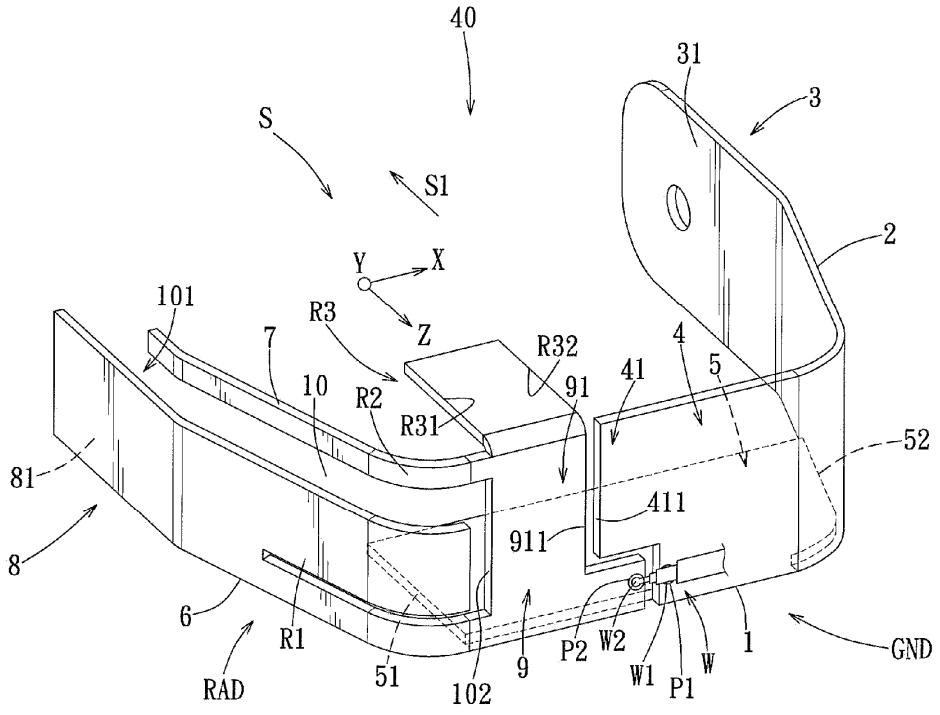
(52) **U.S. Cl.**

CPC . ***H01Q 1/36*** (2013.01); ***H01Q 1/48*** (2013.01); ***H01Q 1/243*** (2013.01)

USPC **343/702**; 343/846

(57) **ABSTRACT**

A three-dimensional antenna includes an L-shaped grounding element and an L-shaped radiating element. The grounding and radiating elements are arranged in a U shape. The grounding element includes a first grounding segment, a second grounding segment extending from the first grounding segment, and a short-circuit point disposed at the second grounding segment. The radiating element includes a first radiating segment opposite to the first grounding segment, a second radiating segment extending from the first radiating segment and adjacent to the second grounding segment, a feeding point disposed at the second radiating segment, and two radiator arms being able to generate respective resonant frequencies.



US 20130201067A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2013/0201067 A1**

(43) **Pub. Date: Aug. 8, 2013**

Hu et al.

(54) **TUNABLE ANTENNA SYSTEM**

(76) Inventors: **Hongfei Hu**, Santa Clara, CA (US); **Mattia Pascolini**, Campbell, CA (US); **Robert W. Schlub**, Cupertino, CA (US); **Matthew A. Mow**, Los Altos, CA (US); **Nanbo Jin**, Sunnyvale, CA (US)

(21) Appl. No.: **13/366,142**

(22) Filed: **Feb. 3, 2012**

Publication Classification

(51) **Int. Cl.**

H01Q 21/30 (2006.01)

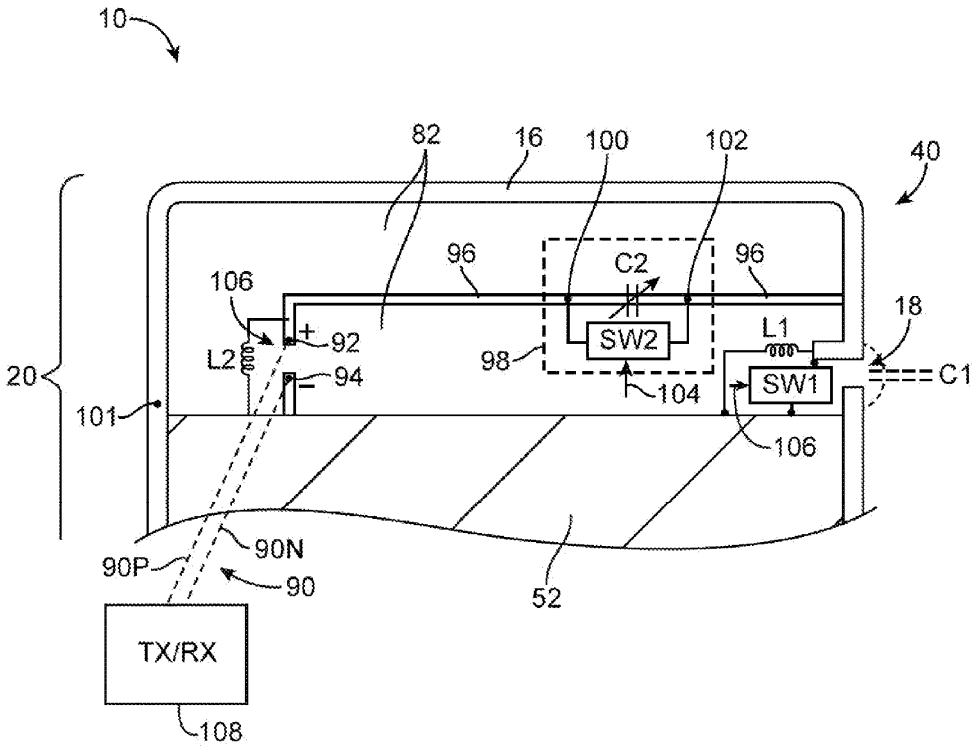
H01Q 1/50 (2006.01)

(52) **U.S. Cl.**

USPC **343/745**; 343/749; 343/876

(57) **ABSTRACT**

An electronic device antenna may be provided with an antenna ground. An antenna resonating element may have a first end that is coupled to the ground using an inductor and may have a second end that is coupled to a peripheral conductive housing member in an electronic device. The peripheral conductive housing member may have a portion that is connected to the ground and may have a portion that is separated from the ground by a gap. The gap may be bridged by an inductor that couples the second end of the antenna resonating element to the antenna ground. The inductor may be bridged by a switch. A tunable circuit such as a capacitor bridged by a switch may be interposed in the antenna resonating element. The switches that bridge the gap and the capacitor may be used in tuning the antenna.



US 20130201071A1

(19) **United States**

(12) **Patent Application Publication**

Uchida

(10) **Pub. No.: US 2013/0201071 A1**

(43) **Pub. Date: Aug. 8, 2013**

(54) **ANTENNA DEVICE**

(75) Inventor: **Jun Uchida**, Shizuoka (JP)

(73) Assignees: **NEC CASIO MOBILE COMMUNICATIONS, LTD.**, Kanagawa (JP); **NEC ACCESS TECHNICA, LTD.**, Shizuoka (JP)

(21) Appl. No.: **13/880,444**

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

(86) PCT No.: **PCT/JP2011/069095**

§ 371 (c)(1),
(2), (4) Date: **Apr. 19, 2013**

(30) **Foreign Application Priority Data**

Oct. 21, 2010 (JP) 2010-236601

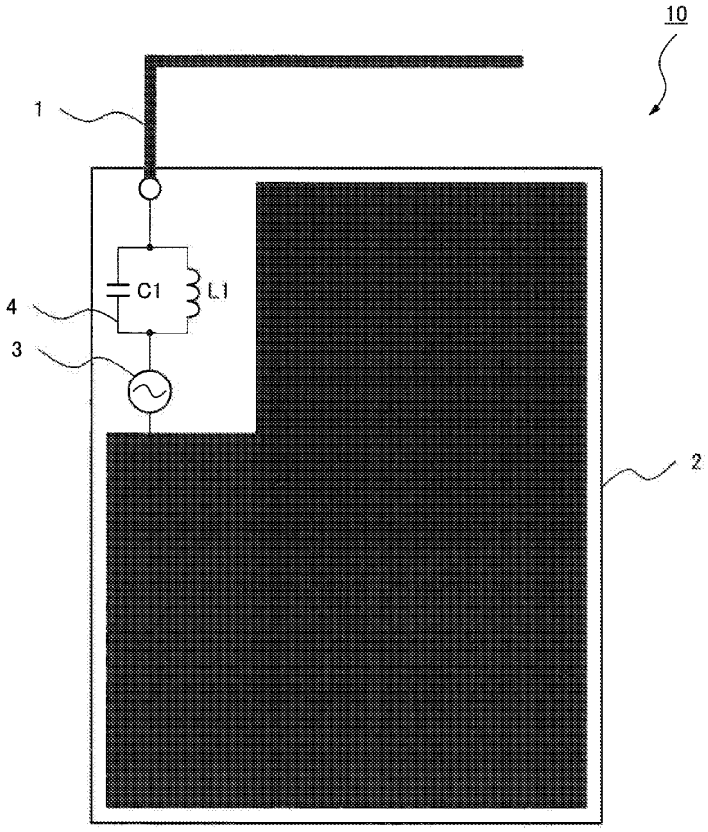
Publication Classification

(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 5/02 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 5/0041*** (2013.01); ***H01Q 5/02*** (2013.01)
USPC **343/820**; 343/850; 343/843

(57) **ABSTRACT**

It is characterized in that it includes; a single antenna element corresponding to a first frequency band and a second frequency band that is different from the first frequency band; a power feeding point for supplying AC power to the antenna element; and a parallel resonance circuit electrically connected between the antenna element and the power feeding point, and the parallel resonance circuit has impedance that is set so as to indicate induction properties in the first second frequency band and set so as to indicate capacitance properties in the second frequency band, and return loss in the first and second frequency bands is sufficiently small so as to enable wireless communication.



US 20130201073A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0201073 A1

(43) Pub. Date: Aug. 8, 2013

Singleton et al.

(54) SUPERLUMINAL ANTENNA

(75) Inventors: **John Singleton**, Los Alamos, NM (US); **Lawrence M. Earley**, Los Alamos, NM (US); **Frank L. Krawczyk**, Santa Fe, NM (US); **James M. Potter**, Los Alamos, NM (US); **William P. Romero**, Los Alamos, NM (US); **Zhi-Fu Wang**, Los Alamos, NM (US)

(73) Assignee: **Los Alamos National Security, LLC**

(21) Appl. No.: **13/368,200**

(22) Filed: **Feb. 7, 2012**

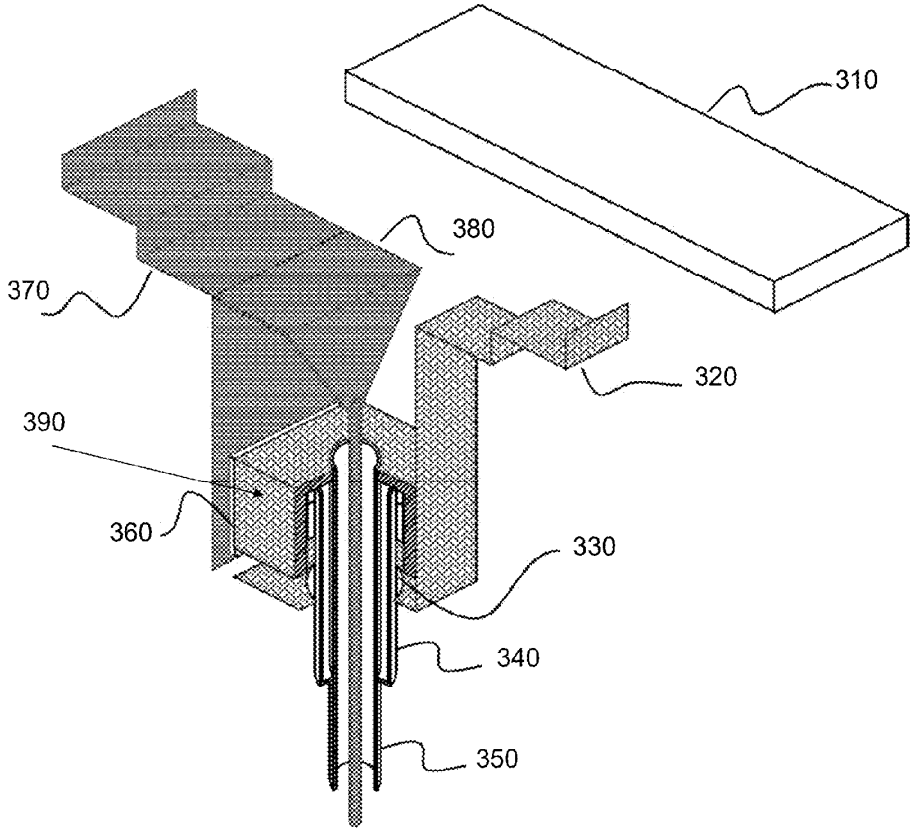
Publication Classification

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

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

(57) **ABSTRACT**

A superluminal antenna element integrates a balun element to better impedance match an input cable or waveguide to a dielectric radiator element, thus preventing stray reflections and consequent undesirable radiation. For example, a dielectric housing material can be used that has a cutout area. A cable can extend into the cutout area. A triangular conductor can function as an impedance transition. An additional cylindrical element functions as a sleeve balun to better impedance match the radiator element to the cable.



US 20130201074A1

(19) **United States**

(12) **Patent Application Publication**

Harper et al.

(10) **Pub. No.: US 2013/0201074 A1**

(43) **Pub. Date: Aug. 8, 2013**

(54) **A LOOP ANTENNA FOR MOBILE HANDSET AND OTHER APPLICATIONS**

(75) Inventors: **Marc Harper**, Cambridge (GB); **Devis Iellici**, Cambridge (GB); **Christoper Tomlin**, Cambridge (GB)

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

(21) Appl. No.: **13/878,971**

(22) PCT Filed: **Sep. 28, 2011**

(86) PCT No.: **PCT/GB11/51837**

§ 371 (c)(1),
(2), (4) Date: **Apr. 11, 2013**

(30) **Foreign Application Priority Data**

Oct. 15, 2010 (GB) 1017472.0

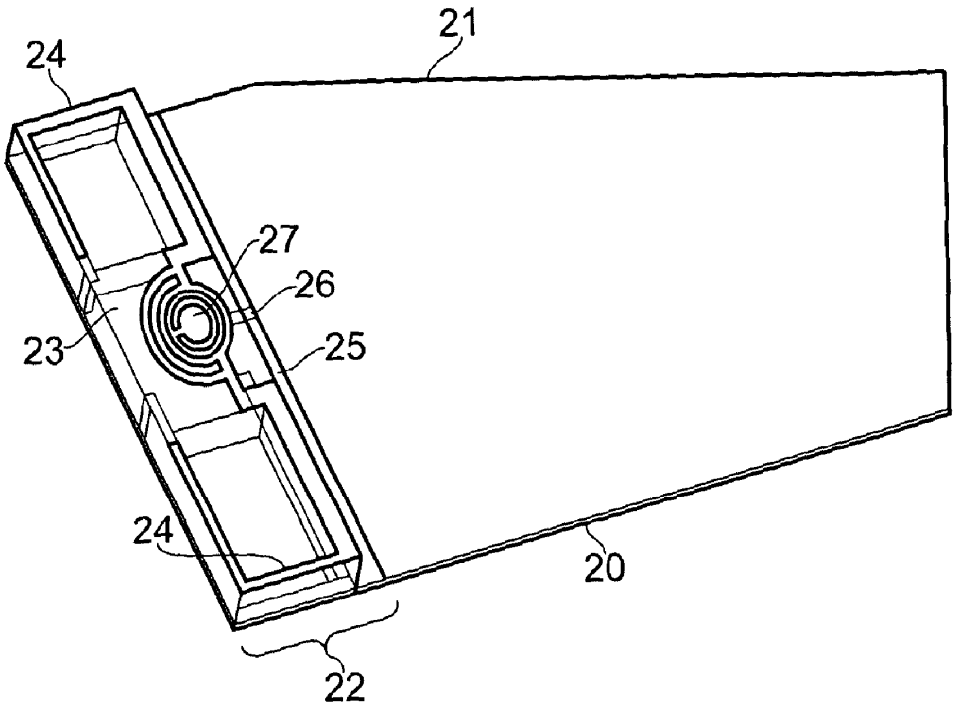
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 7/005*** (2013.01)
USPC **343/870**; 343/866

(57) **ABSTRACT**

There is disclosed a loop antenna for mobile handsets and other devices. The antenna comprises a dielectric substrate (**23**) having first and second opposed surfaces and a conductive track (**24**) formed on the substrate (**23**). A feed point (**26**) and a grounding point (**25**) are provided adjacent to each other on the first surface of the substrate (**23**), with the conductive track (**24**) extending in generally opposite directions from the feed point (**26**) and grounding point (**25**) respectively and winding around the substrate (**23**) to the second surface and passing along a path generally opposite to the path taken on the first surface of the dielectric substrate (**23**). The conductive tracks (**24**) then connect to respective sides of a conductive arrangement (**27**) that extends into a central part of a loop formed by the conductive track (**24**) on the second surface of the dielectric substrate (**23**). The conductive arrangement (**27**) comprises both inductive and capacitive elements. The antenna can be multi-moded and operate in several frequency bands. Alternatively, the loop antenna is fed parasitically by a monopole or a feeding loop. The parasitic loop antenna my alternatively comprise a conductive loading plate instead of the conductive arrangement.



US 20130201075A1

(19) **United States**

(12) **Patent Application Publication**

SANFORD

(10) **Pub. No.: US 2013/0201075 A1**

(43) **Pub. Date: Aug. 8, 2013**

(54) **ANTENNA SYSTEM AND METHOD**

(71) Applicant: **John R. SANFORD**, Encinitas, CA (US)

(72) Inventor: **John R. SANFORD**, Encinitas, CA (US)

(73) Assignee: **UBIQUITI NETWORKS INC.**, San Jose, CA (US)

(21) Appl. No.: **13/791,163**

(22) Filed: **Mar. 8, 2013**

Related U.S. Application Data

(63) Continuation of application No. 13/366,283, filed on Feb. 4, 2012, now Pat. No. 8,421,704.

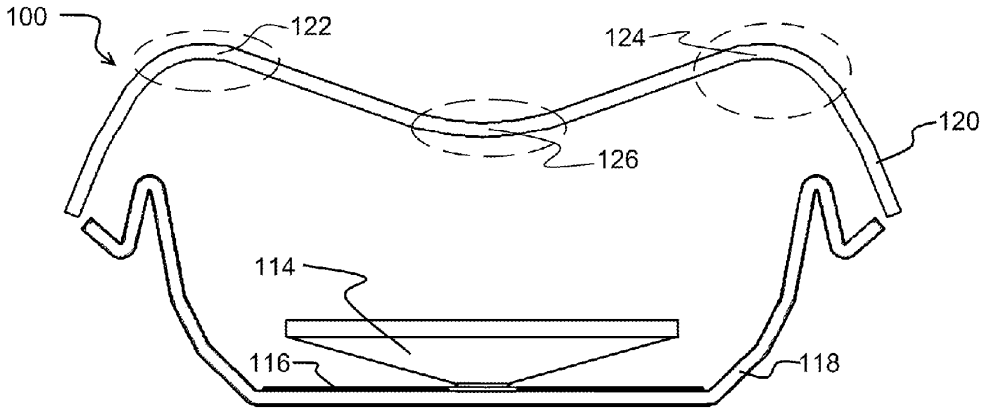
Publication Classification

(51) **Int. Cl.**
H01Q 1/42 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 1/42*** (2013.01)
USPC **343/872**; 29/600

(57) **ABSTRACT**

A radiator coupled to an antenna patch disposed along a first end of the radiator, said patch disposed on an insulator. A ground plane is connected to the insulator and a radome is disposed opposite a second end of the radiator. The radome may have a region presenting a convex surface towards the radiator, and the radome has a second region presenting a concave surface towards the radiator. The first end of the conical radiator is the apex of the cone. A ground plane is included and a portion of the ground plane is a planar surface and another portion extends away from the planar portion towards the radome. Also disclosed is a method for forming a radiation pattern by shaping the radome to effectuate a predetermined radiation pattern using localized convex and concave surfaces positioned on the radome at different points in relation to the conical radiator.



US 20130203364A1

(19) **United States**

(12) **Patent Application Publication**

Darnell et al.

(10) **Pub. No.: US 2013/0203364 A1**

(43) **Pub. Date: Aug. 8, 2013**

(54) **TUNABLE ANTENNA SYSTEM WITH MULTIPLE FEEDS**

(76) Inventors: **Dean F. Darnell**, San Jose, CA (US); **Yuehui Ouyang**, Cupertino, CA (US); **Hao Xu**, Cupertino, CA (US); **Enrique Ayala Vazquez**, Watsonville, CA (US); **Yijun Zhou**, Sunnyvale, CA (US); **Peter Bevelacqua**, Cupertino, CA (US); **Joshua G. Nickel**, San Jose, CA (US); **Nanbo Jin**, Sunnyvale, CA (US); **Matthew A. Mow**, Los Altos, CA (US); **Robert W. Schlub**, Cupertino, CA (US); **Mattia Pascolini**, Campbell, CA (US); **Hongfei Hu**, Santa Clara, CA (US)

(21) Appl. No.: **13/368,855**

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

Publication Classification

(51) **Int. Cl.**

H04B 1/18 (2006.01)

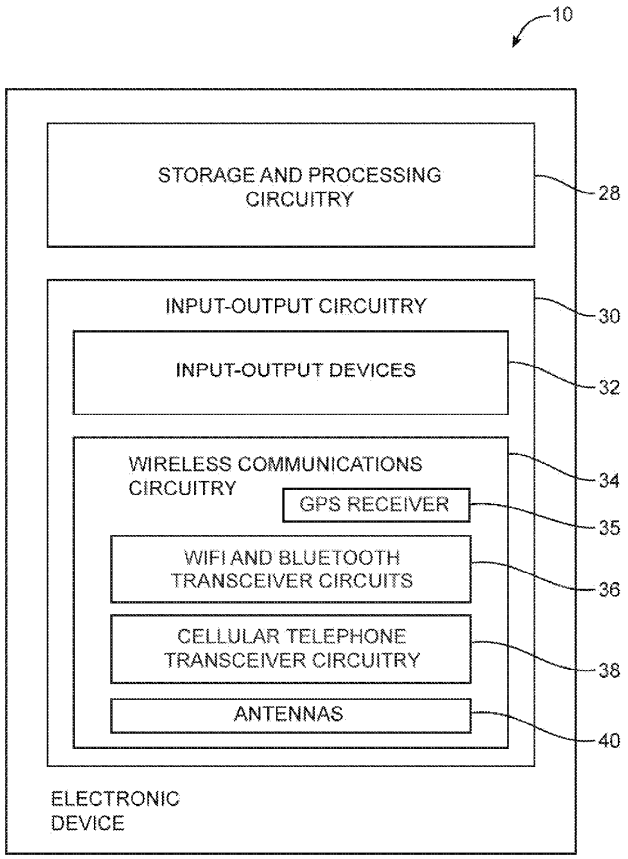
H04B 1/40 (2006.01)

(52) **U.S. Cl.**

USPC **455/77**; 455/132; 455/73; 455/90.3

(57) **ABSTRACT**

Electronic devices may be provided that contain wireless communications circuitry. The wireless communications circuitry may include radio-frequency transceiver circuitry and antenna structures. The antenna structures may form an antenna having first and second feeds at different locations. The transceiver circuit may have a first circuit that handles communications using the first feed and may have a second circuit that handles communications using the second feed. A first filter may be interposed between the first feed and the first circuit and a second filter may be interposed between the second feed and the second circuit. The first and second filters and the antenna may be configured so that the first circuit can use the first feed without being adversely affected by the presence of the second feed and so that the second circuit can use the second feed without being adversely affected by the presence of the first feed.



US 20130207846A1

(19) **United States**

(12) **Patent Application Publication**

CHIU et al.

(10) **Pub. No.: US 2013/0207846 A1**

(43) **Pub. Date: Aug. 15, 2013**

(54) **MOBILE DEVICE AND MANUFACTURING METHOD THEREOF**

(75) Inventors: **Chien-Pin CHIU**, Taoyuan County (TW); **Hsiao-Wei WU**, Taoyuan County (TW); **Tiao-Hsing TSAI**, Taoyuan County (TW); **Ying-Chih WANG**, Taoyuan County (TW)

(73) Assignee: **HTC CORPORATION**, Taoyuan City (TW)

(21) Appl. No.: **13/442,644**

(22) Filed: **Apr. 9, 2012**

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/396,122, filed on Feb. 14, 2012.

Publication Classification

(51) **Int. Cl.**

H01Q 9/04 (2006.01)

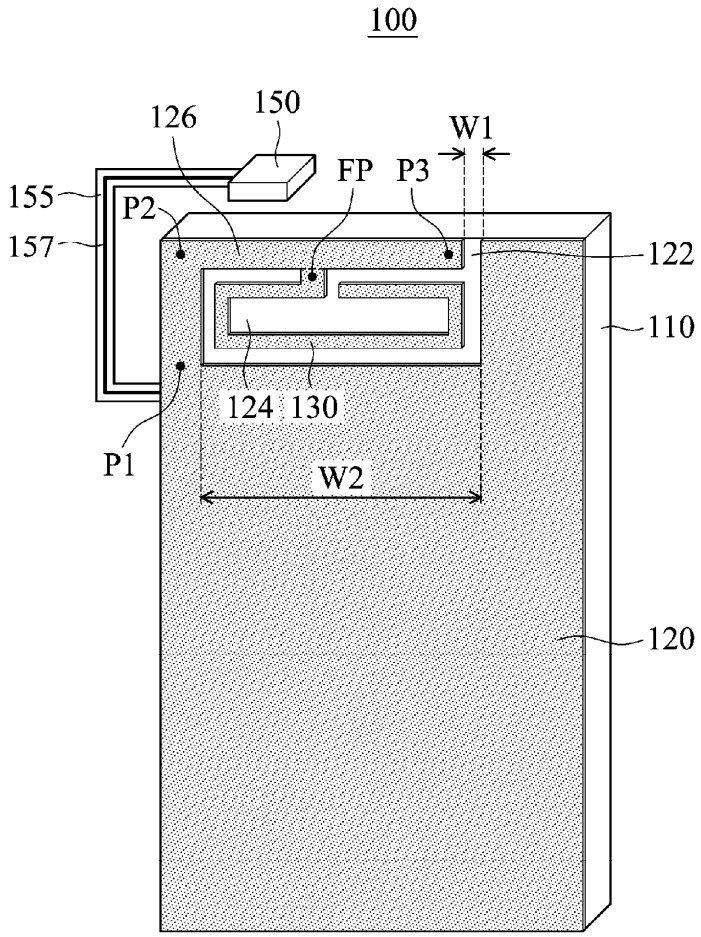
H01P 11/00 (2006.01)

(52) **U.S. Cl.**

USPC ..... **343/700 MS**; 29/600

(57) **ABSTRACT**

A mobile device includes a substrate, a ground element, and a radiation branch. The ground element includes a ground branch, wherein an edge of the ground element has a notch extending into the interior of the ground element so as to form a slot region, and the ground branch partially surrounds the slot region. The radiation branch is substantially inside the slot region, and is coupled to the ground branch of the ground element. The ground branch and the radiation branch form an antenna structure.



US 20130207849A1

(19) **United States**

(12) **Patent Application Publication**

Shibahara et al.

(10) **Pub. No.: US 2013/0207849 A1**

(43) **Pub. Date: Aug. 15, 2013**

(54) **CHIP ANTENNA AND MANUFACTURING METHOD THEREOF**

(76) Inventors: **Katsuo Shibahara**, Kuwana-shi (JP); **Natsuhiko Mori**, Kuwana-shi (JP); **Tatsuya Hayashi**, Kuwana-shi (JP)

(21) Appl. No.: **13/876,219**

(22) PCT Filed: **Sep. 2, 2011**

(86) PCT No.: **PCT/JP2011/070069**

§ 371 (c)(1),
(2), (4) Date: **Apr. 5, 2013**

(30) **Foreign Application Priority Data**

Sep. 28, 2010 (JP) 2010-217021

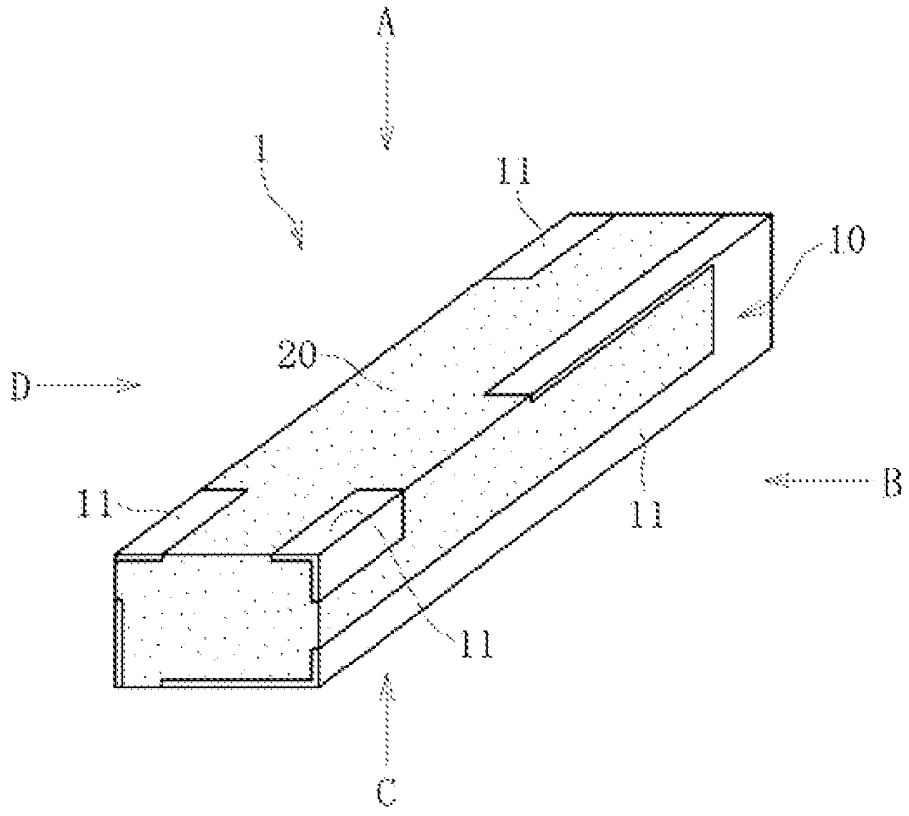
Publication Classification

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

(52) **U.S. Cl.**
CPC . ***H01Q 1/38*** (2013.01); ***H01P 11/00*** (2013.01)
USPC ..... **343/700 MS**; 29/600

(57) **ABSTRACT**

After a three-dimensional antenna pattern (**10**) is formed by bending a conductive plate, the three-dimensional antenna pattern (**10**) thus bent is supplied in an injection molding die set as an insert component and a base (**20**) is formed by injection molding of a resin. With this, a chip antenna (**1**) comprising the three-dimensional antenna pattern (**10**) can be formed easier as comparison to a case where the antenna pattern is formed over a plurality of surfaces by printing and the like.



US 20130207851A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2013/0207851 A1**

(43) **Pub. Date: Aug. 15, 2013**

Dabov

(54) **ELECTRONIC DEVICE WITH COMPONENT TRIM ANTENNA**

(76) Inventor: **Teodor Dabov**, San Francisco, CA (US)

(21) Appl. No.: **13/396,499**

(22) Filed: **Feb. 14, 2012**

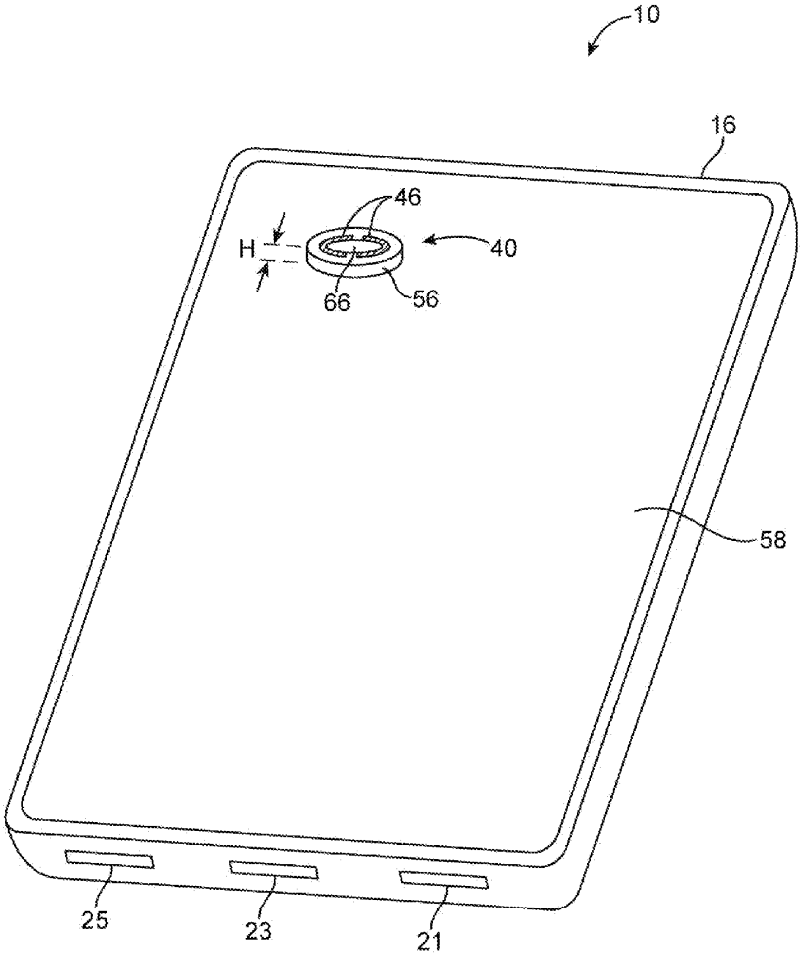
Publication Classification

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

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

(57) **ABSTRACT**

An optical component such as a camera, an acoustic component such as a speaker, or other electrical component may be mounted on the surface of an electronic device housing. A window structure may overlap the component. The window structure may be formed from an optically transparent material to allow light to pass or may be formed from an acoustically transparent material to allow acoustic signals to pass. A conductive structure such as a metal member may surround at least part of the periphery of the window structure. The conductive structure may serve as an antenna structure for an antenna. Radio-frequency transceiver circuitry may be coupled to an antenna feed for the antenna using a radio-frequency transmission line. The conductive structure may serve as a cosmetic trim for the electrical component.



US 20130207852A1

(19) **United States**

(12) **Patent Application Publication**

NAKANO

(10) **Pub. No.: US 2013/0207852 A1**

(43) **Pub. Date: Aug. 15, 2013**

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

(75) Inventor: **Shinichi NAKANO**, Nagaokakyo-shi (JP)

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

(21) Appl. No.: **13/570,521**

(22) Filed: **Aug. 9, 2012**

(30) **Foreign Application Priority Data**

Aug. 10, 2011 (JP) 2011-174490
Jun. 1, 2012 (JP) 2012-126395

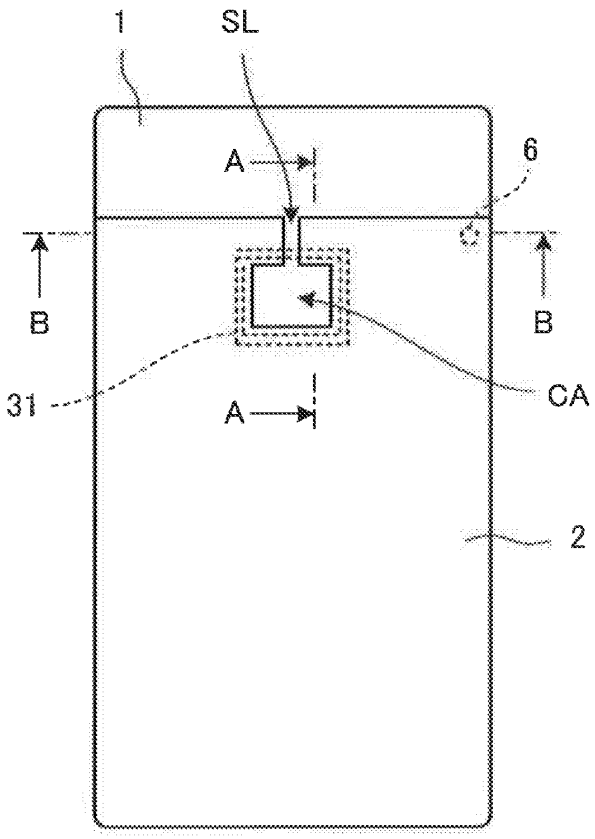
Publication Classification

(51) **Int. Cl.**
H01Q 1/48 (2006.01)
H01Q 1/22 (2006.01)

(52) **U.S. Cl.**
CPC ... ***H01Q 1/48*** (2013.01); ***H01Q 1/22*** (2013.01)
USPC **343/702**; 343/848

(57) **ABSTRACT**

In an antenna apparatus, on an undersurface of a metal cover, a feeding coil module is disposed. In a casing, a printed circuit board is included. A ground conductor, a feeding pin, and a ground connection conductor are disposed on the printed circuit board. When the metal cover is mounted on the casing, the feeding pin is in contact with a connection portion of the feeding coil module and is electrically connected thereto. The ground connection conductor is in contact with the metal cover and connects the metal cover to the ground conductor. The ground connection conductor is disposed at either side of a slit outside an area in which the current density of an induced current flowing through the metal cover is in a range from a maximum value to approximately 80% of the maximum value or one side of the slit in the area.



US 20130207853A1

(19) **United States**

(12) **Patent Application Publication**

YAMAMOTO et al.

(10) **Pub. No.: US 2013/0207853 A1**

(43) **Pub. Date: Aug. 15, 2013**

(54) **ANTENNA SYSTEM FOR WIRELESS TERMINAL DEVICES**

(71) Applicant: **LENOVO (SINGAPORE) PTE. LTD.**, (US)

(72) Inventors: **OSAMU YAMAMOTO**, Kanagawa-ken (JP); **TAKAAI OKADA**, Kanagawa-ken (JP)

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

(21) Appl. No.: **13/749,172**

(22) Filed: **Jan. 24, 2013**

(30) **Foreign Application Priority Data**

Feb. 11, 2012 (JP) JP2012-027868

Publication Classification

(51) **Int. Cl.**

H01Q 1/00 (2006.01)

H01Q 1/24 (2006.01)

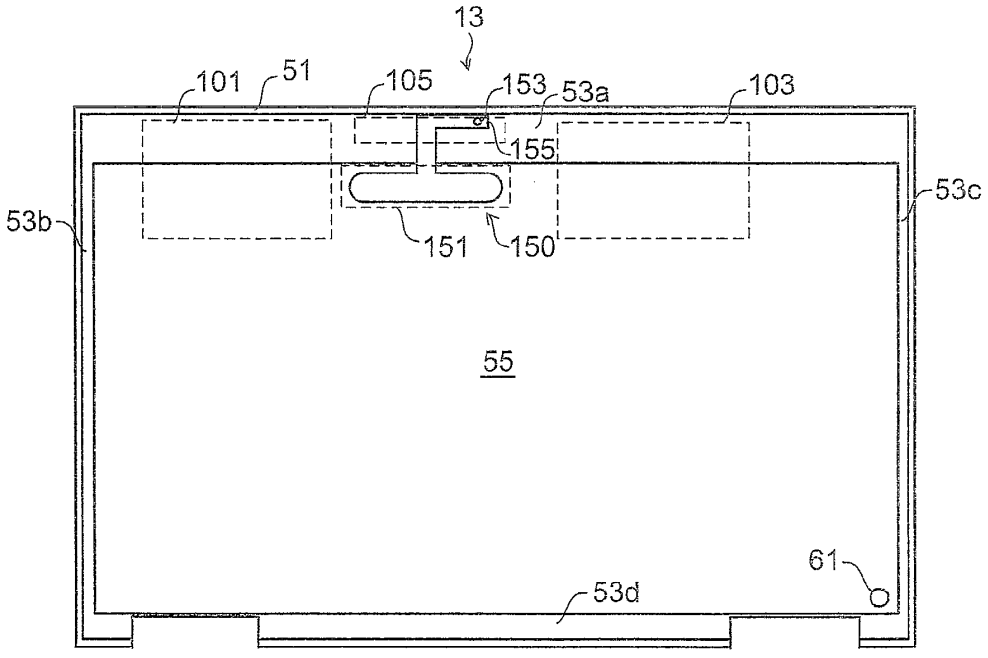
(52) **U.S. Cl.**

CPC ***H01Q 1/002*** (2013.01); ***H01Q 1/241*** (2013.01)

USPC **343/702**

(57) **ABSTRACT**

An antenna system suitable for a mobile device is disclosed. The mobile device includes a display casing with a conductive region and a non-conductive region. The antenna system includes a driven element having an inverted-F antenna arranged in the non-conductive region of the display casing. The display casing is also provided with an electrostatic discharge (ESD) conductor as a countermeasure against ESD. The ESD conductor is connected to the conductive region of the casing. The ESD conductor causes static charges in the air to be discharged to the conductive region of the casing. The ESD conductor also produces harmonic resonance and exchanges electromagnetic energy with the driven element to improve the gain of the driven element.



US 20130207854A1

(19) **United States**

(12) **Patent Application Publication**

RYU

(10) **Pub. No.: US 2013/0207854 A1**

(43) **Pub. Date: Aug. 15, 2013**

(54) **PORTABLE TERMINAL**

(71) Applicant: **LG ELECTRONICS INC.**, (US)

(72) Inventor: **Seungwoo RYU**, Uijeongbu (KR)

(73) Assignee: **LG ELECTRONICS INC.**, Seoul (KR)

(21) Appl. No.: **13/757,292**

(22) Filed: **Feb. 1, 2013**

(30) **Foreign Application Priority Data**

Feb. 15, 2012 (KR) 10-2012-0015448

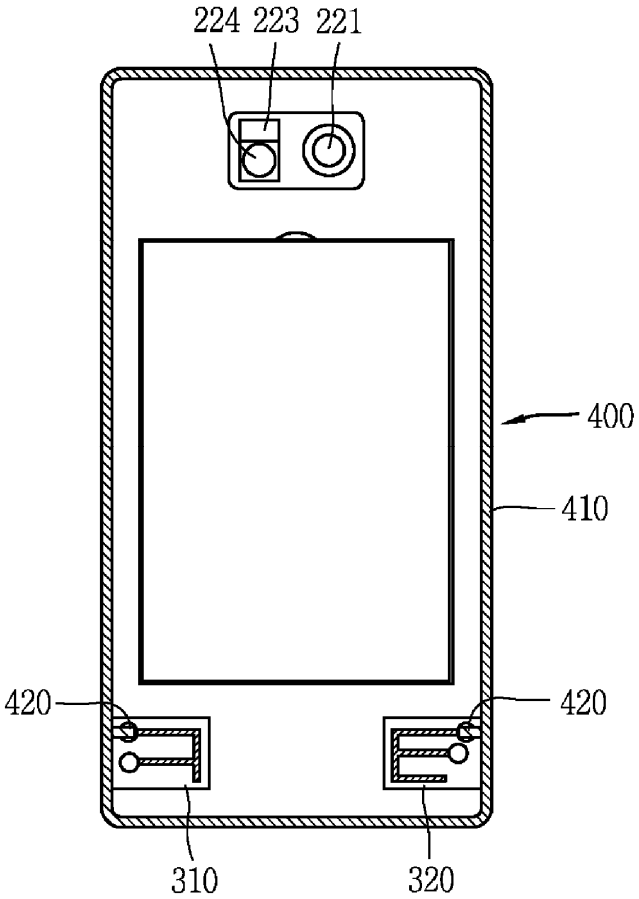
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 21/28*** (2013.01)
USPC **343/702**

(57) **ABSTRACT**

The present disclosure relates to a portable terminal having antennas for transmitting or receiving wireless signals. The portable terminal includes a terminal body, a first antenna mounted in the terminal body to transmit or receive a wireless signal, a second antenna disposed with being spaced apart from the first antenna and set to transmit or receive a wireless signal at a frequency band different from the first antenna, and a connection unit configured to electrically connect the first and second antennas to reduce a frequency interference between the first and second antennas, at least part of the connection unit being formed along an edge of the terminal body.



US 20130207855A1

(19) **United States**

(12) **Patent Application Publication**

CHIEN et al.

(10) **Pub. No.: US 2013/0207855 A1**

(43) **Pub. Date: Aug. 15, 2013**

(54) **MOBILE DEVICE**

(75) Inventors: **Chih-Ling CHIEN**, Taoyuan City (TW); **Chien-Hsin HUANG**, Taoyuan City (TW); **Hsiao-Wei WU**, Taoyuan City (TW); **Wen-Hsiung Shih**, Taoyuan City (TW)

(73) Assignee: **HTC CORPORATION**, Taoyuan City (TW)

(21) Appl. No.: **13/396,122**

(22) Filed: **Feb. 14, 2012**

Publication Classification

(51) **Int. Cl.**

H01Q 1/48 (2006.01)

H01Q 1/06 (2006.01)

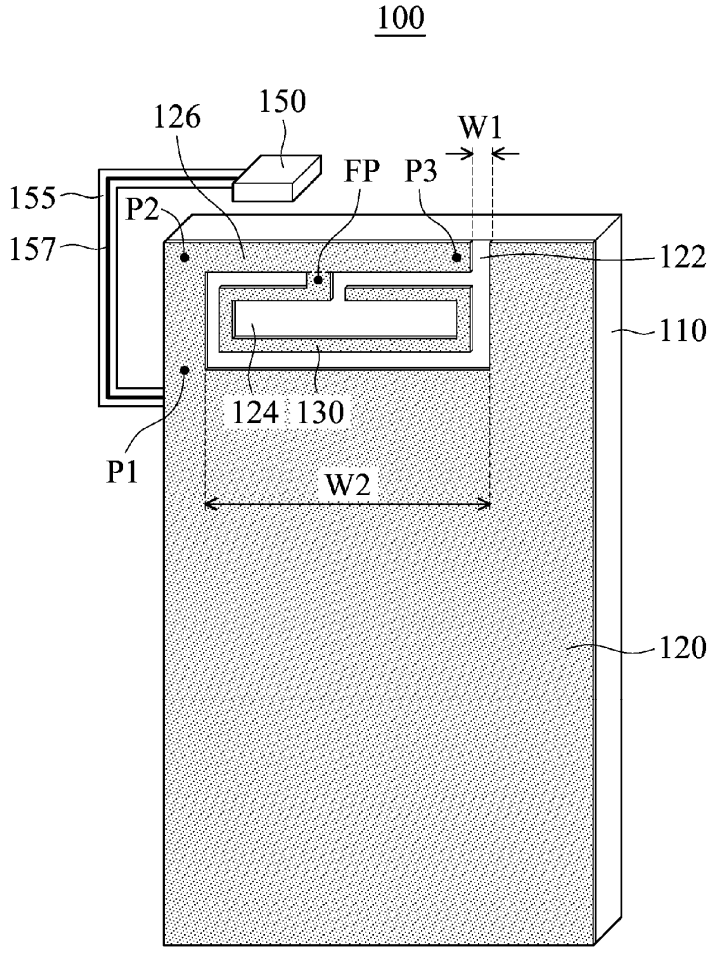
H01Q 1/36 (2006.01)

(52) **U.S. Cl.**

USPC **343/721**; 343/720; 343/848

(57) **ABSTRACT**

A mobile device includes a substrate, a ground element, and a radiation branch. The ground element includes a ground branch, wherein an edge of the ground element has a notch extending into an interior of the ground element so as to form a slot region, and the ground branch partially surrounds the slot region. The radiation branch is substantially inside the slot region, and is coupled to the ground branch of the ground element. The ground branch and the radiation branch form an antenna structure.



US 20130207856A1

(19) **United States**

(12) **Patent Application Publication**

Oon et al.

(10) **Pub. No.: US 2013/0207856 A1**

(43) **Pub. Date: Aug. 15, 2013**

(54) **HYBRID ANTENNA FOR PORTABLE COMMUNICATION DEVICES**

(71) Applicant: **MOTOROLA SOLUTIONS, INC.**, (US)

(72) Inventors: **Chin Keong Alexander Oon**, Bayan Lepas (MY); **Sin Keng Lee**, Kuala Ketil (MY)

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

(21) Appl. No.: **13/767,520**

(22) Filed: **Feb. 14, 2013**

(30) **Foreign Application Priority Data**

Feb. 15, 2012 (MY) PI2012000651

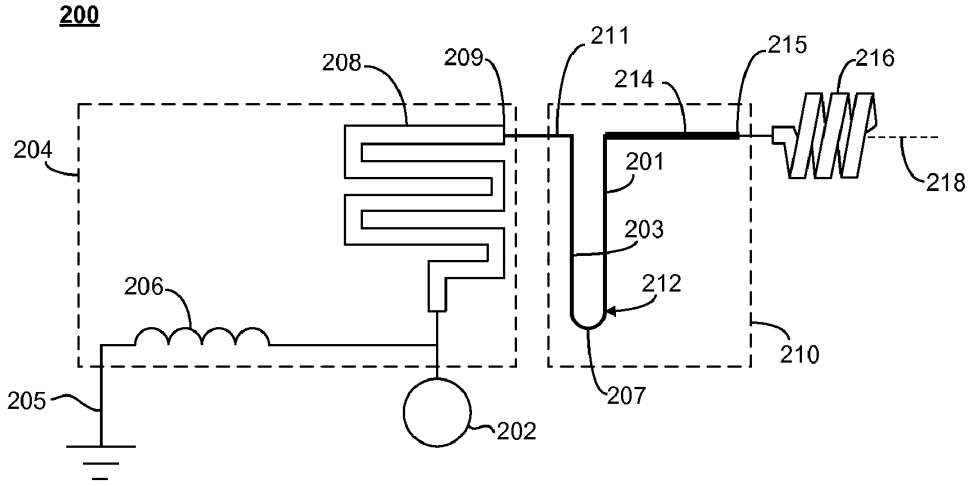
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 9/06*** (2013.01)
USPC **343/729**

(57) **ABSTRACT**

An antenna structure (**111**) commences at a feed point (**202**) that is coupled to an inverted F antenna section (**204**). The inverted F antenna section is coupled to a monopole section (**210**) that is further coupled to a helical section (**216**). The inverted F section, monopole section, and helical section are coupled in series together.



US 20130207857A1

(19) **United States**

(12) **Patent Application Publication**

Thomas

(10) **Pub. No.: US 2013/0207857 A1**

(43) **Pub. Date: Aug. 15, 2013**

(54) **HIGH-FREQUENCY ANTENNA**

(75) Inventor: **Thierry Thomas**, Varces Allieres Et Risset (FR)

(73) Assignee: **COMMISSARIAT A L'ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES**, Paris (FR)

(21) Appl. No.: **13/704,566**

(22) PCT Filed: **Jun. 14, 2011**

(86) PCT No.: **PCT/FR11/51346**

§ 371 (c)(1),
(2), (4) Date: **Feb. 27, 2013**

(30) **Foreign Application Priority Data**

Jun. 15, 2010 (FR) 1054724

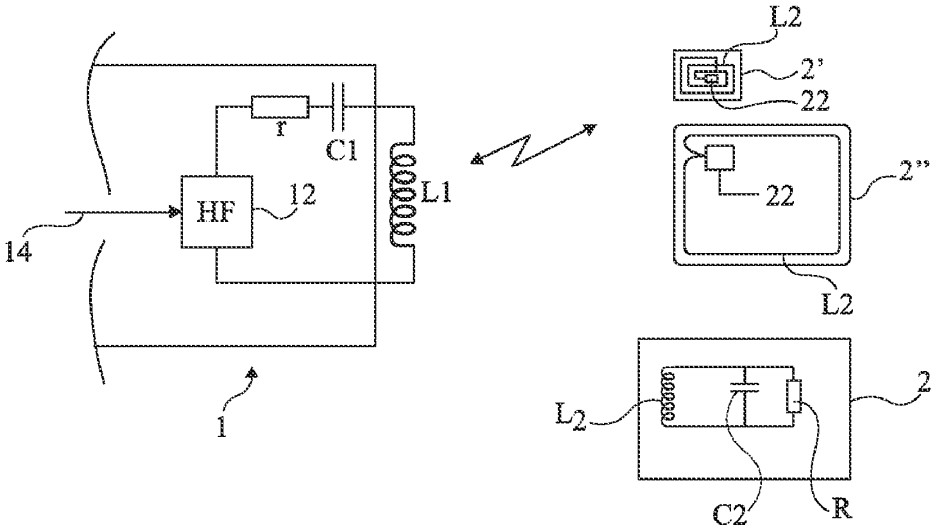
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 7/00*** (2013.01)
USPC **343/741**

(57) **ABSTRACT**

The invention relates to an inductive antenna formed from at least two pairs of segments (**32**, **34**) geometrically butted together and each comprising first (**322**, **342**) and second (**324**, **344**) parallel conductors insulated from each other, each pair having, at each end, a single terminal for the electrical connection of its first conductor to that of the neighbouring pair, in which said pairs are of a first type (**3**), in which the conductors are interrupted approximately at their mid-points so as to define the two segments, the first (respectively second) conductor of one segment being connected to the second (respectively first) conductor of the other segment of the pair, or of a second type, in which the first conductor is interrupted approximately at its mid-point so as to define the two segments, the second conductor not being interrupted.



US 20130207858A1

(19) **United States**

(12) **Patent Application Publication**

Yukimoto et al.

(10) **Pub. No.: US 2013/0207858 A1**

(43) **Pub. Date: Aug. 15, 2013**

(54) **ANTENNA-DEVICE SUBSTRATE AND ANTENNA DEVICE**

(75) Inventors: **Shinsuke Yukimoto**, Chichibu-Gun (JP); **Ryo Saito**, Chichibu-Gun (JP)

(73) Assignee: **MITSUBIISHI MATERIALS CORPORATION**, Tokyo (JP)

(21) Appl. No.: **13/878,690**

(22) PCT Filed: **Oct. 13, 2011**

(86) PCT No.: **PCT/JP2011/005723**

§ 371 (c)(1),
(2), (4) Date: **Apr. 10, 2013**

(30) **Foreign Application Priority Data**

Oct. 15, 2010 (JP) 2010-233129

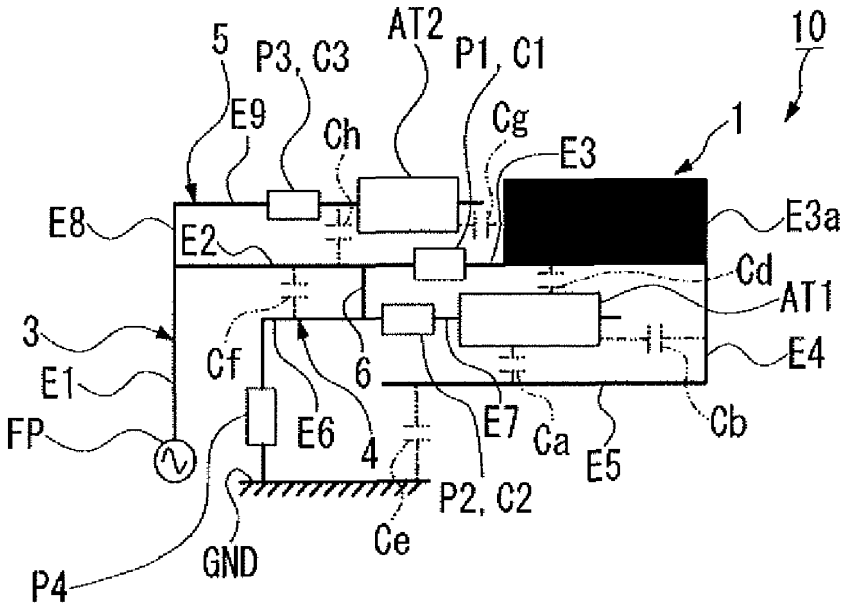
Publication Classification

(51) **Int. Cl.**
H01Q 9/04 (2006.01)
H01Q 21/30 (2006.01)

(52) **U.S. Cl.**
CPC . ***H01Q 9/04*** (2013.01); ***H01Q 21/30*** (2013.01)
USPC **343/749**

(57) **ABSTRACT**

Provided is an antenna-device substrate which is capable of flexibly adjusting multiple resonance frequencies, and also provided is an antenna device. The antenna-device substrate is provided with a substrate main body (**2**), a ground plane (GND) on the surface of the substrate main body (**2**), first to third elements (**1** to **5**), and a short part (**6**) connecting the first element (**3**) and the second element (**4**). The first element is provided with a feed point (FP) at the base end and extends comprising a first connector (C**1**) of a first passive element (P**1**). The second element is connected to the ground plane and is provided with a first antenna element (AT**1**) at the tip end, and extends comprising a second connector (C**2**) of a second passive element (P**2**) and comprising a fourth passive element (P**4**). The third element extends comprising a third connector (C**3**) of a third passive element (P**3**). The first element extends with a gap provided between the first element and each of the second element, the third element, and the ground plane such that a floating capacitance can be generated therebetween.



US 20130207861A1

(19) **United States**

(12) **Patent Application Publication**

Huang et al.

(10) **Pub. No.: US 2013/0207861 A1**

(43) **Pub. Date: Aug. 15, 2013**

(54) **WIDEBAND ANTENNA**

(76) Inventors: **Kuo-Lun Huang**, Hsinchu (TW); **Yu-Yu Chiang**, Hsinchu (TW); **Shang-Ching Tseng**, Hsinchu (TW)

(21) Appl. No.: **13/462,783**

(22) Filed: **May 2, 2012**

(30) **Foreign Application Priority Data**

Feb. 10, 2012 (TW) 101104315

Publication Classification

(51) **Int. Cl.**

H01Q 1/36 (2006.01)

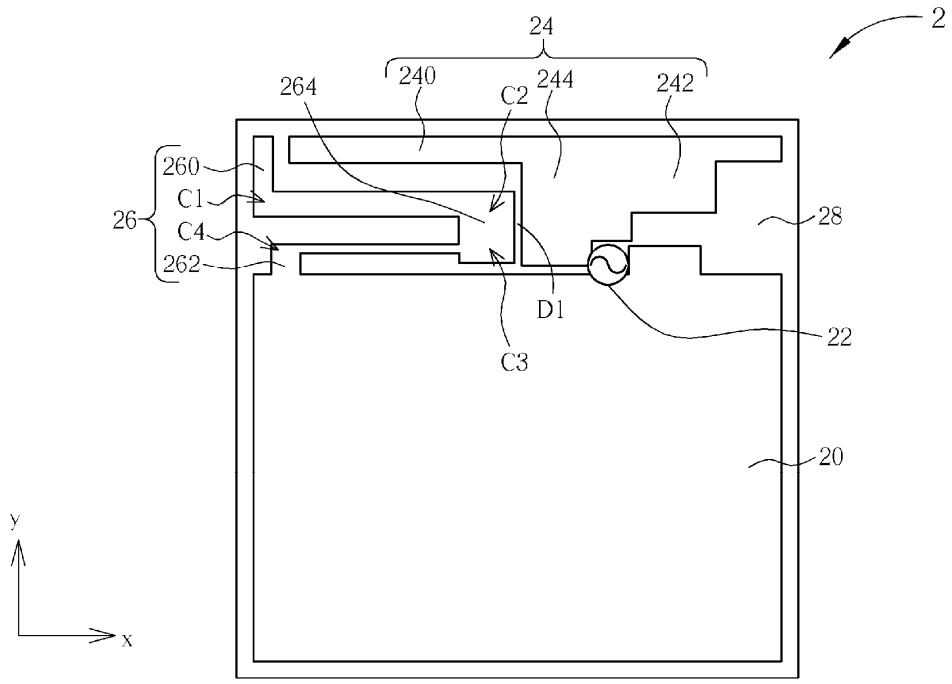
H01Q 13/10 (2006.01)

(52) **U.S. Cl.**

USPC ..... **343/767**; 343/700 MS

(57) **ABSTRACT**

A wideband antenna includes a grounding unit electrically connected to a ground, a feed-in source for transmitting and receiving radio frequency signals, a first radiating body including a first radiating unit extending along a first direction, a second radiating unit extending along a second direction opposite to the first direction, and a conducting unit extending along a third direction, and a second radiating body including a short-circuit unit electrically connected to the grounding unit, a third radiating unit including a branch to generate a coupling connection effect with the conducting unit via a first distance, wherein an average perpendicular distance between the second radiating body and the grounding unit is smaller than an average perpendicular distance between the first radiating body and the grounding unit.



US 20130207862A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0207862 A1

(43) Pub. Date: Aug. 15, 2013

Farooq et al.

(54) **LOW IMPEDANCE SLOT FED ANTENNA**

(75) Inventors: **Shaikh Farooq**, Aalborg (DK); **Simon Svendsen**, Aalborg (DK); **Ole Jagielski**, Frederikshavn (DK); **Pevand Bahramzy**, Taastrup (DK)

(73) Assignee: **Molex Incorporation**, Lisle, IL (US)

(21) Appl. No.: **13/878,666**

(22) PCT Filed: **Oct. 12, 2011**

(86) PCT No.: **PCT/US11/55869**

§ 371 (c)(1),
(2), (4) Date: **Apr. 10, 2013**

Related U.S. Application Data

(60) Provisional application No. 61/392,187, filed on Oct. 12, 2010.

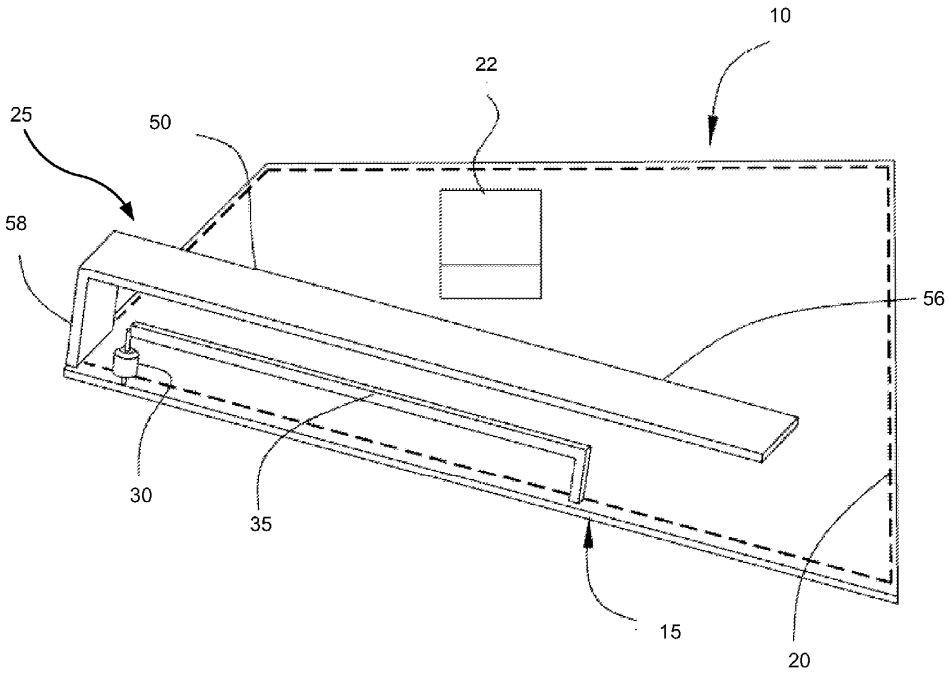
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 13/106*** (2013.01)
USPC **343/767**

(57) **ABSTRACT**

A low impedance slot fed antenna with a slot and an element configured to resonate is depicted. The orientation of the slot is configured so that a slot current is not opposed to a return current associated with the element. This helps decrease coupling between the slot and the element, which can benefit high Q antennas.



US 20130207871A1

(19) **United States**

(12) **Patent Application Publication**

Dinallo

(10) **Pub. No.: US 2013/0207871 A1**

(43) **Pub. Date: Aug. 15, 2013**

(54) **COMPACT MULTI-BAND ANTENNA WITH INTEGRATING FED THROUGH CO-AXIAL CABLE**

(71) Applicant: **Carlo Dinallo**, Plantation, FL (US)

(72) Inventor: **Carlo Dinallo**, Plantation, FL (US)

(21) Appl. No.: **13/573,674**

(22) Filed: **Oct. 3, 2012**

Related U.S. Application Data

(60) Provisional application No. 61/542,371, filed on Oct. 3, 2011.

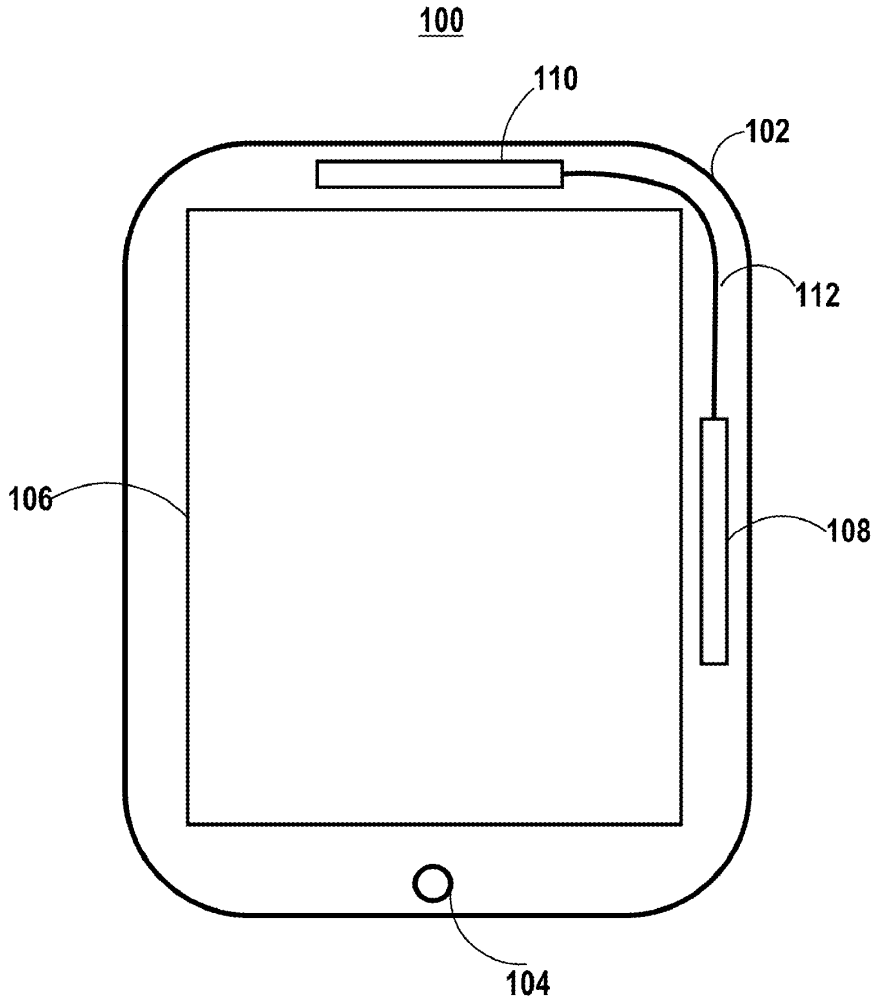
Publication Classification

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

(52) **U.S. Cl.**
CPC ***H01Q 1/50*** (2013.01)
USPC **343/860**

(57) **ABSTRACT**

An antenna system comprises an antenna that integrates a separate fed through coaxial cable as part of its resonant structure. The fed through coaxial cable is used to feed a second antenna. This design allows for the antenna and the fed through cable to be accommodated in a very limited space at the edge of a handheld electronic device.



US 20130207873A1

(19) **United States**

(12) **Patent Application Publication**

Chou

(10) **Pub. No.: US 2013/0207873 A1**

(43) **Pub. Date: Aug. 15, 2013**

(54) **METHOD OF LOOP ANTENNA AND IMPROVED LOOP ANTENNA THEREOF**

(75) Inventor: **Chen-Yu Chou**, New Taipei City (TW)

(73) Assignee: **WISTRON CORPORATION**, New Taipei City (TW)

(21) Appl. No.: **13/470,357**

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

(30) **Foreign Application Priority Data**

Feb. 9, 2012 (TW) 101104255

Publication Classification

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

(52) **U.S. Cl.**
USPC **343/866**

(57) **ABSTRACT**

An improved method of loop antenna and improved loop antenna thereof are provided, the method is used to generate an antenna resonant frequency for a conformed specific communication by modifying a resonant wavelength of a basic loop antenna. The improved method of loop antenna includes the following steps: connecting a first antenna radiator to a resonant point of the basic loop antenna electrically, and using an additional length from the connected first antenna radiator additional length to increase the resonant wavelength of the basic loop antenna, in order to generate an antenna resonant frequency conformed to the specific communication system.