



US 20100277377A1

(19) **United States**(12) **Patent Application Publication****Sato et al.**(10) **Pub. No.: US 2010/0277377 A1**(43) **Pub. Date: Nov. 4, 2010**(54) **PORTABLE WIRELESS DEVICE**(30) **Foreign Application Priority Data**

(75) Inventors: **Kenichi Sato**, Miyagi (JP); **Daigo Imano**, Miyagi (JP); **Hironori Kikuchi**, Miyagi (JP); **Yasuhiro Kitajima**, Kanagawa (JP); **Tatsuya Sano**, Miyagi (JP); **Nobuhiro Iwai**, Kanagawa (JP)

Jan. 15, 2008 (JP) 2008-006314

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

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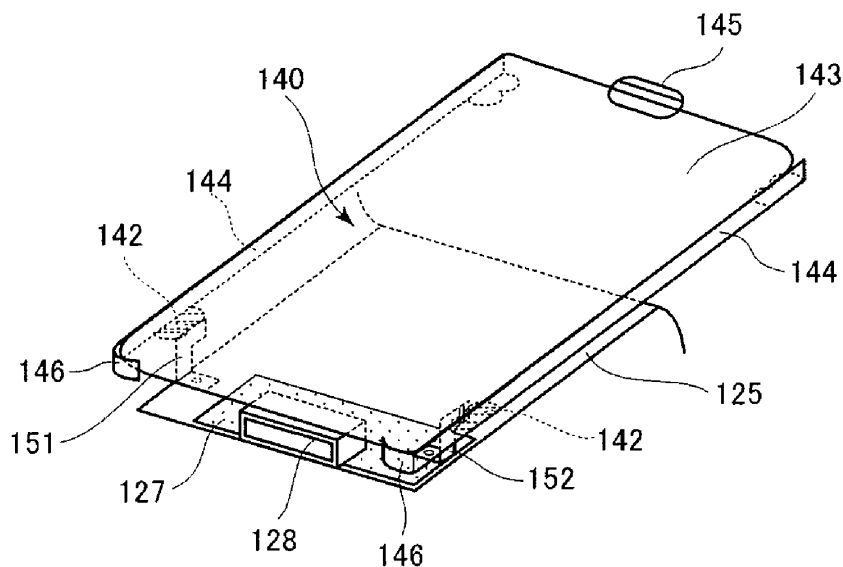
(73) Assignee: **PANASONIC CORPORATION**,
Osaka (JP)

(21) Appl. No.: **12/812,452**(22) PCT Filed: **Dec. 26, 2008**(86) PCT No.: **PCT/JP2008/003998**

§ 371 (c)(1),
(2), (4) Date:

Jul. 9, 2010

Provided is a portable communication device, specifically a portable wireless device which is thin while maintaining excellent reception sensitivity even when the device is laid on a metal top panel. As such device (100), a foldable portable cellular phone (100) is provided with a battery box (117) opened on the side of a rear surface (115), and a circuit board (121) having an antenna power feed point (124) is arranged inside a lower case (114). The battery box (117) is covered with a battery cover section (140) removably attached to the lower case (114). The battery cover section (140) is formed of a member having conductivity, and attached to the lower case (114) by having contact point members (151, 152) in between for carrying a current to a reinforcing conductive plate (125) which is to be a GND layer of the circuit board (121). The battery cover section (140) attached to the lower case (114) is electrically connected to the reinforcing conductive plate (125) by making the battery cover section abut to contact point members (151, 152).



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(19) **United States**(12) **Patent Application Publication**
SHIMIZU et al.(10) **Pub. No.: US 2010/0277378 A1**(43) **Pub. Date: Nov. 4, 2010**(54) **ANTENNA****Publication Classification**(75) Inventors: **Mie SHIMIZU**, Kanagawa-ken
(JP); **Kazuhiko KUBOTA**,
Kyoto-fu (JP)(51) **Int. Cl.**
H01Q 7/00 (2006.01)
H01Q 1/24 (2006.01)
(52) **U.S. Cl.** **343/702**; 343/867; 343/866

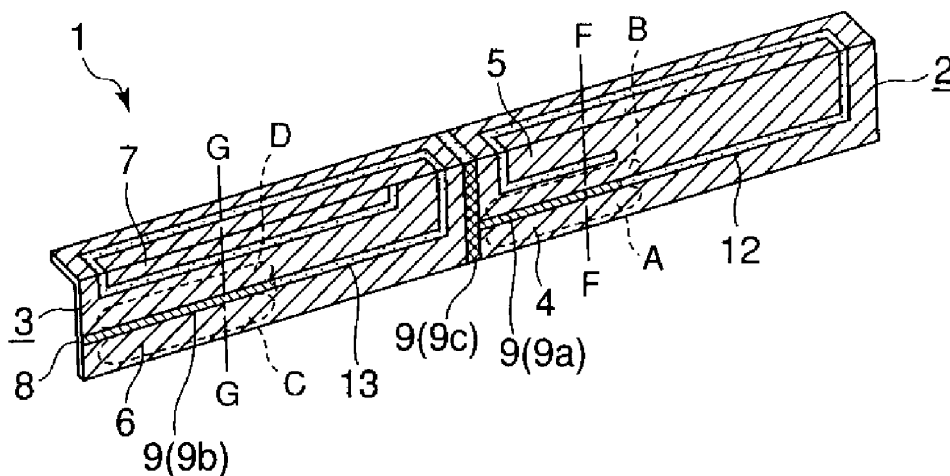
Correspondence Address:

Studebaker & Brackett PC**One Fountain Square, 11911 Freedom Drive, Suite
750****Reston, VA 20190 (US)**(73) Assignee: **MURATA MANUFACTURING
CO., LTD.**, Kyoto-fu (JP)(21) Appl. No.: **12/838,050**(22) Filed: **Jul. 16, 2010****Related U.S. Application Data**(63) Continuation of application No. PCT/JP2009/050465,
filed on Jan. 15, 2009.(30) **Foreign Application Priority Data**

Jan. 17, 2008 (JP) 2008-008193

ABSTRACT

The antenna includes a power-feeding radiation electrode and a non-power-feeding radiation electrode are provided adjacent to each other with a gap therebetween on the flexible substrate, which also is bendable. The power-feeding radiation electrode is used to perform antenna operation in a basic mode in which resonant operation is performed at a basic frequency and antenna operation in a high-order mode in which resonant operation is performed at a frequency higher than the basic frequency. The power-feeding radiation electrode includes a loop path configured such that the power-feeding radiation electrode first extends in a direction away from a power-feeding end and an open end is bent toward the power-feeding end. The non-power-feeding radiation electrode has one end serving as a ground-side end and the other end serving as an open end. A dielectric body having permittivity higher than the bendable, flexible substrate is provided on a front surface or a back surface of the power-feeding radiation electrode provided in a region including a portion in which voltage of a resonant frequency in the high-order mode is zero potential and a region in the vicinity of that portion.



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US 20100283685A1

(19) **United States**(12) **Patent Application Publication****Tsai et al.**(10) **Pub. No.: US 2010/0283685 A1**(43) **Pub. Date: Nov. 11, 2010**(54) **MULTI-BAND ANTENNA****Publication Classification**

(76) Inventors: **Yung-Chih Tsai**, Tu-Cheng City (TW); **Jia-Hung Su**, Tu-Cheng City (TW); **Kai Shih**, Tu-Cheng City (TW); **Yu-Yuan Wu**, Tu-Cheng City (TW)

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

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

(57) **ABSTRACT**

A multi-band antenna has a grounding plate with a first end and a second end defined at a longer side thereof. The longer side has an upward first connecting portion adjacent to the first end and a vertical second connecting portion. A feeding portion extends downwards from a lower edge of the second connecting portion. A first antenna radiator extends towards a same direction with respect to the second connecting portion along the grounding plate from an upper side of the second connecting portion. A second antenna radiator includes a first radiating portion, a second radiating portion and a third radiating portion. A third antenna radiator extends parallel to the first radiating portion from a side of the feeding portion. A coupling component includes a first section, a second section and a third section extending opposite to the first section from an end of the second section.

Correspondence Address:

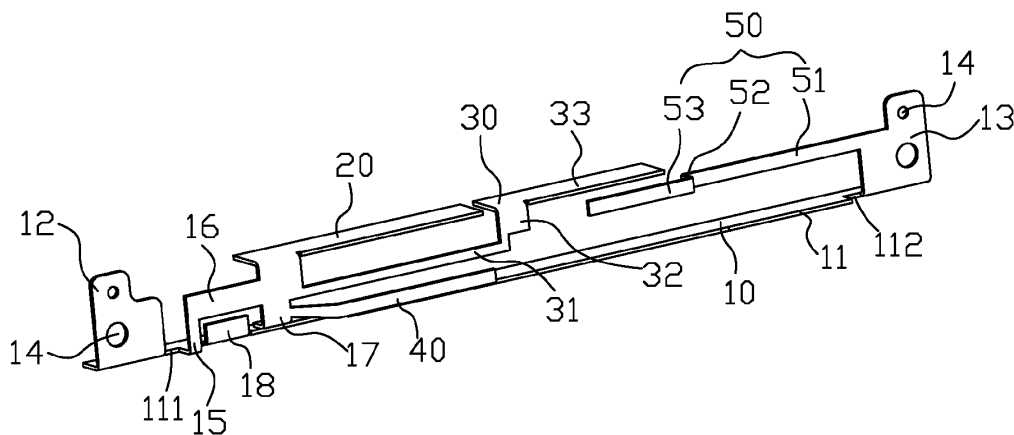
**LIN & ASSOCIATES INTELLECTUAL PROP-
ERTY, INC.**

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SARATOGA, CA 95070-0339 (US)

(21) Appl. No.: **12/436,125**

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



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US 20100283687A1

(19) **United States**(12) **Patent Application Publication**
Ehelen(10) **Pub. No.: US 2010/0283687 A1**(43) **Pub. Date: Nov. 11, 2010**(54) **PANEL ANTENNA AND METHOD OF FORMING A PANEL ANTENNA**(30) **Foreign Application Priority Data**(75) Inventor: **Mathias Martin Ernest Ehelen,**
Upper Hutt (NZ)

Jul. 18, 2007 (NZ) 556602

Mar. 7, 2008 (NZ) 566529

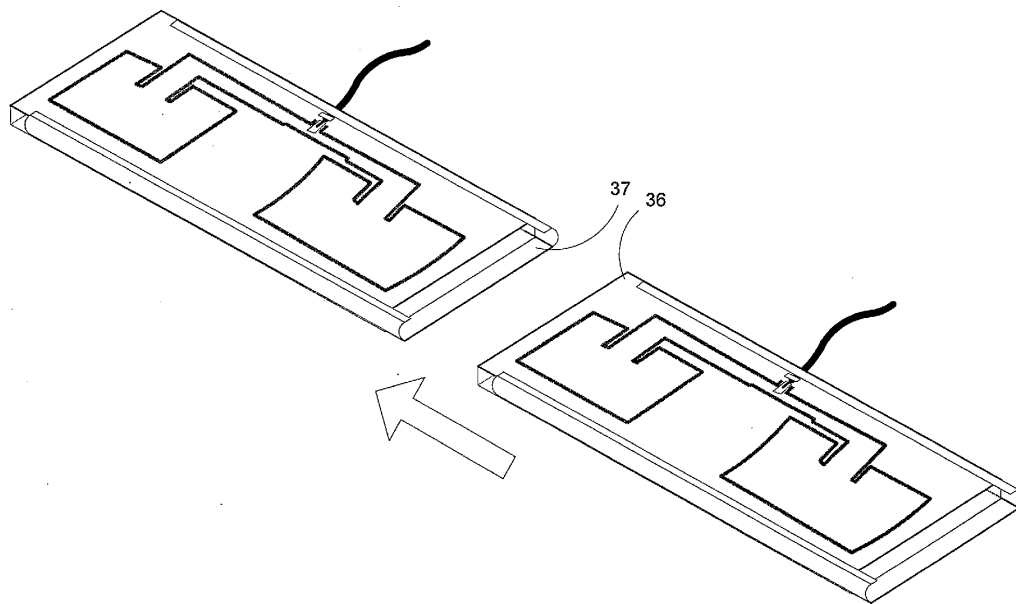
Correspondence Address:

MERCHANT & GOULD PC**P.O. BOX 2903****MINNEAPOLIS, MN 55402-0903 (US)****Publication Classification**(51) **Int. Cl.****H01Q 1/38** (2006.01)**H01Q 9/04** (2006.01)**H01P 11/00** (2006.01)(52) **U.S. Cl. 343/700 MS; 29/600**(73) Assignee: **TIMES-7 HOLDINGS LIMITED,**
Mahora (NZ)(57) **ABSTRACT**(21) Appl. No.: **12/669,554**(22) PCT Filed: **Jul. 17, 2008**(86) PCT No.: **PCT/NZ08/00171**

§ 371 (c)(1),

(2), (4) Date: **Jul. 28, 2010**

A method of forming an antenna by providing a first panel including a first conductive sheet secured to a sheet of dielectric material and forming one or more radiating elements and/or a feed network in the conductive sheet by forming grooves in the conductive sheet. The first panel may be a construction grade building panel or a similar suitable panel. The method enables panel antennas to be manufactured using inexpensive materials using inexpensive manufacturing processes



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US 20100283688A1

(19) **United States**

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

(10) **Pub. No.: US 2010/0283688 A1**

(43) **Pub. Date: Nov. 11, 2010**

(54) **MULTIBAND FOLDED DIPOLE
TRANSMISSION LINE ANTENNA**

Publication Classification

(75) Inventors: **CHRISTOS L. KINEZOS**,
Sunrise, FL (US); **ULF JAN-OVE
MATTSSON**, Plantation, FL (US);
**LORENZO A. PONCE DE
LEON**, Lake Worth, FL (US)

(51) **Int. Cl.**
H01Q 9/26 (2006.01)
H01Q 9/04 (2006.01)
H01Q 1/24 (2006.01)
(52) **U.S. Cl.** **343/702; 343/803; 343/700 MS**

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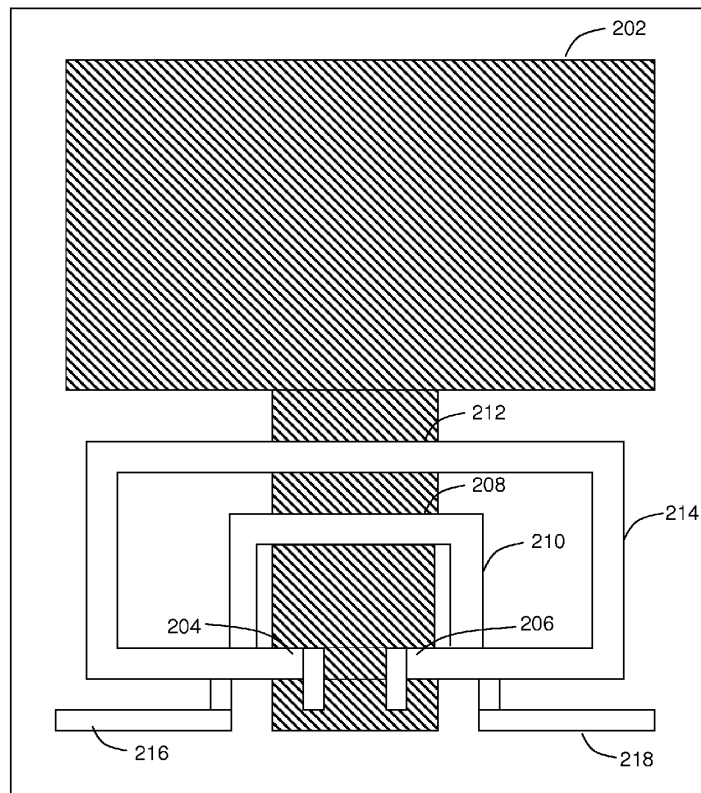
(73) Assignee: **MOTOROLA, INC.**, Schaumburg,
IL (US)

(21) Appl. No.: **12/437,448**

(22) Filed: **May 7, 2009**

(57) **ABSTRACT**

A multiband folded dipole transmission line antenna (**300, 400, 500**) including a plurality of concentric-like loops (**210, 214, 508**) where each loop comprises at least one transmission line element (**204, 206**) and at least a pair of folded dipole antenna elements (**302, 304**), a first connection point and a second connection point shared among the plurality of concentric-like loops, and a first inverted L antenna element (**216**) coupled to the first connection point and a second inverted L antenna element (**218**) coupled to the second connection point. Additional embodiments are disclosed



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US 20100283693A1

(19) **United States**(12) **Patent Application Publication****XIE et al.**(10) **Pub. No.: US 2010/0283693 A1**(43) **Pub. Date: Nov. 11, 2010**(54) **WIRELESS TERMINAL ANTENNA****Related U.S. Application Data**

(75) Inventors: **Yanping XIE**, Shenzhen (CN);
Shaoqing CHEN, Shenzhen (CN);
Ping LEI, Shenzhen (CN);
Yongling BAN, Shenzhen (CN);
Shuhui SUN, Shenzhen (CN); **Yao**
LAN, Shenzhen (CN)

(63) Continuation of application No. PCT/CN2008/
073808, filed on Dec. 29, 2008.

(30) **Foreign Application Priority Data**

Dec. 28, 2007 (CN) 200720196651.8

Publication Classification

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

(52) **U.S. Cl.** **343/729; 343/901**

(57) **ABSTRACT**

A wireless terminal antenna is disclosed. The antenna includes a pull rod, a pull rod pedestal located at the base of the pull rod, and a spiral coil. One end of the spiral coil is electrically connected with the pull rod pedestal. The pull rod is axially retractable along the pull rod pedestal until it is retracted into the space enclosed by the spiral coil. At idle time, the pull rod is nested inside the spiral coil so that it is short and portable. When receiving signals normally, the pull rod can be pulled out. The antenna is miniaturized, portable, and provides good performance.

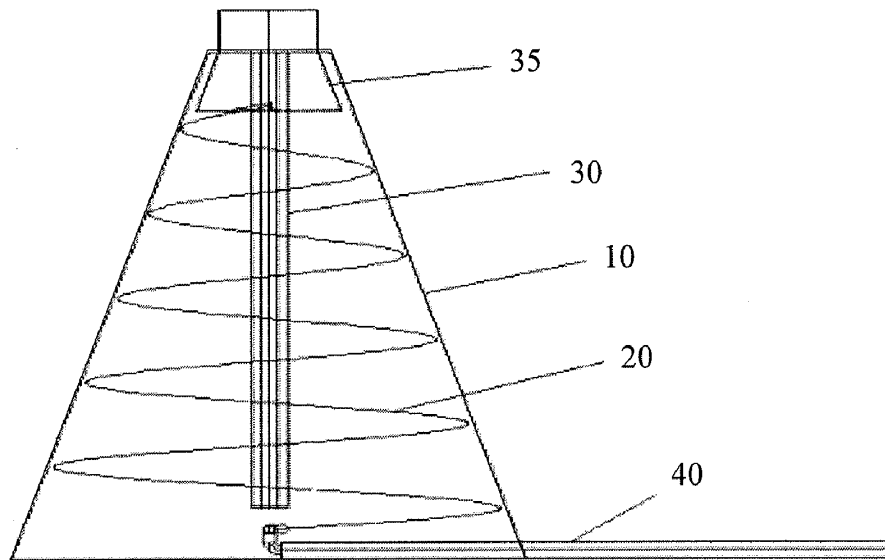
Correspondence Address:

Leydig, Voit & Mayer, Ltd**(for Huawei Technologies Co., Ltd)****Two Prudential Plaza Suite 4900, 180 North Stetson
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(73) Assignee: **HUAWEI DEVICE CO., LTD.**,
Shenzhen (CN)

(21) Appl. No.: **12/825,042**

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



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US 20100283694A1

(19) **United States**(12) **Patent Application Publication**
KATO(10) **Pub. No.: US 2010/0283694 A1**(43) **Pub. Date: Nov. 11, 2010**(54) **COMPOSITE ANTENNA**(30) **Foreign Application Priority Data**(75) Inventor: **Noboru KATO**, Moriyama-shi (JP)

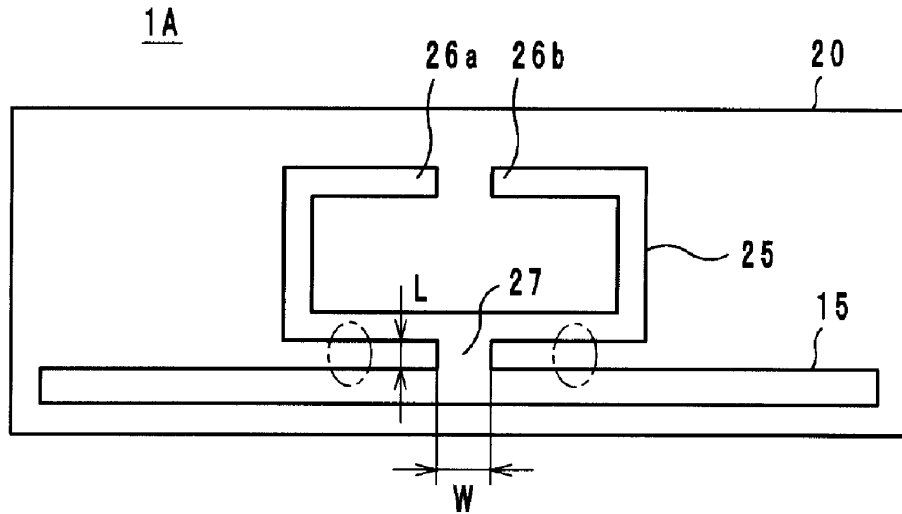
Mar. 3, 2008 (JP) 2008-052145

Nov. 25, 2008 (JP) 2008-299780

Correspondence Address:

MURATA MANUFACTURING COMPANY, LTD.
C/O KEATING & BENNETT, LLP
1800 Alexander Bell Drive, SUITE 200
Reston, VA 20191 (US)**Publication Classification**(51) **Int. Cl.**
H01Q 1/00 (2006.01)(52) **U.S. Cl.** **343/730**(57) **ABSTRACT**(73) Assignee: **MURATA MANUFACTURING**
CO., LTD., Nagaokakyo-shi (JP)(21) Appl. No.: **12/845,846**(22) Filed: **Jul. 29, 2010****Related U.S. Application Data**(63) Continuation of application No. PCT/JP2009/053693,
filed on Feb. 27, 2009.

A composite antenna achieves favorable radiation characteristics and favorable communication performance, and can be used in short distance communication as well as long distance communication. The composite antenna includes a dipole antenna having an elongated shape, a loop antenna including at least one pair of opposing end portions, and a connection portion arranged to connect the dipole antenna and a point of the loop antenna at which the amplitude of a current flowing in the loop antenna has a maximum value. The dipole antenna performs long distance communication utilizing an electric field, and the loop antenna performs short distance communication utilizing a magnetic field. This composite antenna may be used as a wireless IC device in RFID systems.



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US 20100283701A1

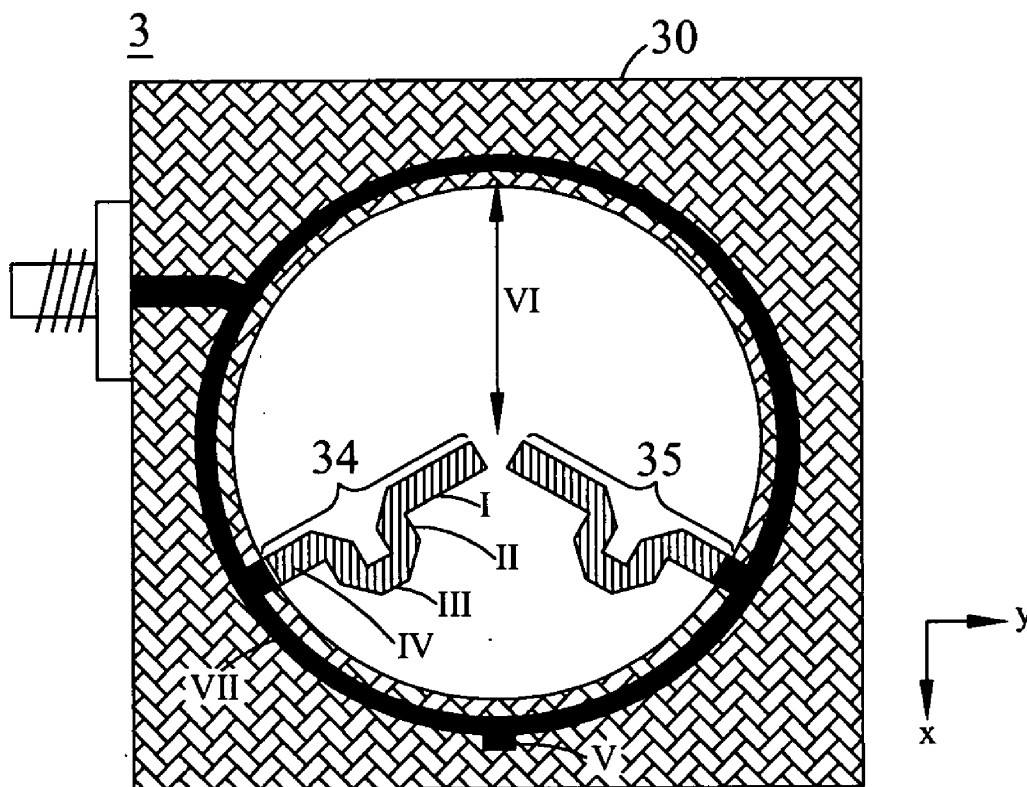
(19) **United States**(12) **Patent Application Publication**
Cheng et al.(10) **Pub. No.: US 2010/0283701 A1**(43) **Pub. Date: Nov. 11, 2010**(54) **PRINT DIPOLE ANTENNA AND
MANUFACTURING METHOD THEREOF****Publication Classification**(75) Inventors: **Li-Yuan Cheng**, Hsinchu (TW);
Fu-Chiarng Chen, Hsinchu (TW)(51) **Int. Cl.**
H01Q 9/16 (2006.01)
H01P 11/00 (2006.01)(52) **U.S. Cl.** **343/793; 29/600**

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2030 MAIN STREET, SUITE 1300
IRVINE, CA 92614 (US)(57) **ABSTRACT**(73) Assignee: **NATIONAL CHIAO TUNG
UNIVERSITY**, Hsinchu (TW)(21) Appl. No.: **12/470,064**(22) Filed: **May 21, 2009**(30) **Foreign Application Priority Data**

May 5, 2009 (TW) 098114909

The present invention discloses a print dipole antenna and manufacturing method thereof. The print dipole antenna has a plurality of resonance frequencies, which comprises a substrate, a ring microstrip line and a ground plane. The ring microstrip line is disposed on one side of the substrate, and the interior of the ring microstrip line is symmetrically disposed with a plurality of parasitic metals. The ground plane is disposed on the other side of the substrate, and has a hollow portion corresponding to the central area of the ring microstrip line. The ring microstrip line has a plurality of end ports including input end ports and output end ports, which may further comprise an open circuit end. The plurality of parasitic metals may be of linear shape or bended in arbitrarily windings. A normal mode signal is fed from the end points of the plurality of parasitic metals.



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US 20100283704A1

(19) **United States**(12) **Patent Application Publication****Hotta et al.**(10) **Pub. No.: US 2010/0283704 A1**(43) **Pub. Date: Nov. 11, 2010**(54) **ANTENNA DEVICE AND ELECTRIC EQUIPMENT**(30) **Foreign Application Priority Data**

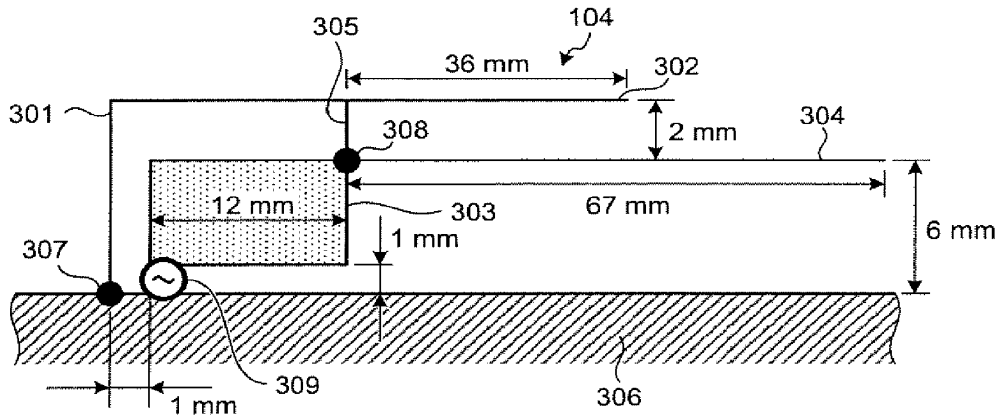
Jul. 29, 2008 (JP) 2008-195529

(76) Inventors: **Hiroyuki Hotta**, Hamura (JP);
Masao Teshima, Kunitachi (JP);
Koichi Sato, Tachikawa (JP)**Publication Classification**(51) **Int. Cl.**
H01Q 9/04 (2006.01)
H01Q 11/00 (2006.01)(52) **U.S. Cl.** **343/843; 343/700 MS**(57) **ABSTRACT**Correspondence Address:
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SUNNYVALE, CA 94085-4040 (US)

According to one embodiment, an antenna device includes a short circuit path, a first open-ended element, a feed side element, a second open-ended element, and a short circuit element. A length, from a ground point to a second end of the first open-ended element through the short circuit path and the first open-ended element, is substantially a quarter of a wavelength of a first resonant frequency. A length, from the ground point to a second end of the second open-ended element through the short circuit path, the short circuit element, and the second open-ended element, is substantially a quarter of a wavelength of a second resonant frequency.

(21) Appl. No.: **12/844,754**(22) Filed: **Jul. 27, 2010****Related U.S. Application Data**

(63) Continuation of application No. 12/415,513, filed on Mar. 31, 2009, now Pat. No. 7,764,238.



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US 20100283707A1

(19) **United States**

(12) **Patent Application Publication**
Foo

(10) **Pub. No.: US 2010/0283707 A1**

(43) **Pub. Date: Nov. 11, 2010**

(54) **DUAL-POLARIZED DUAL-BAND BROAD
BEAMWIDTH DIRECTIVE PATCH ANTENNA**

Publication Classification

(76) Inventor: **Senglee Foo, Irvine, CA (US)**

Correspondence Address:

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P.O. Box 3529
Newport Beach, CA 92659 (US)

(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 1/42 (2006.01)

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

(57) **ABSTRACT**

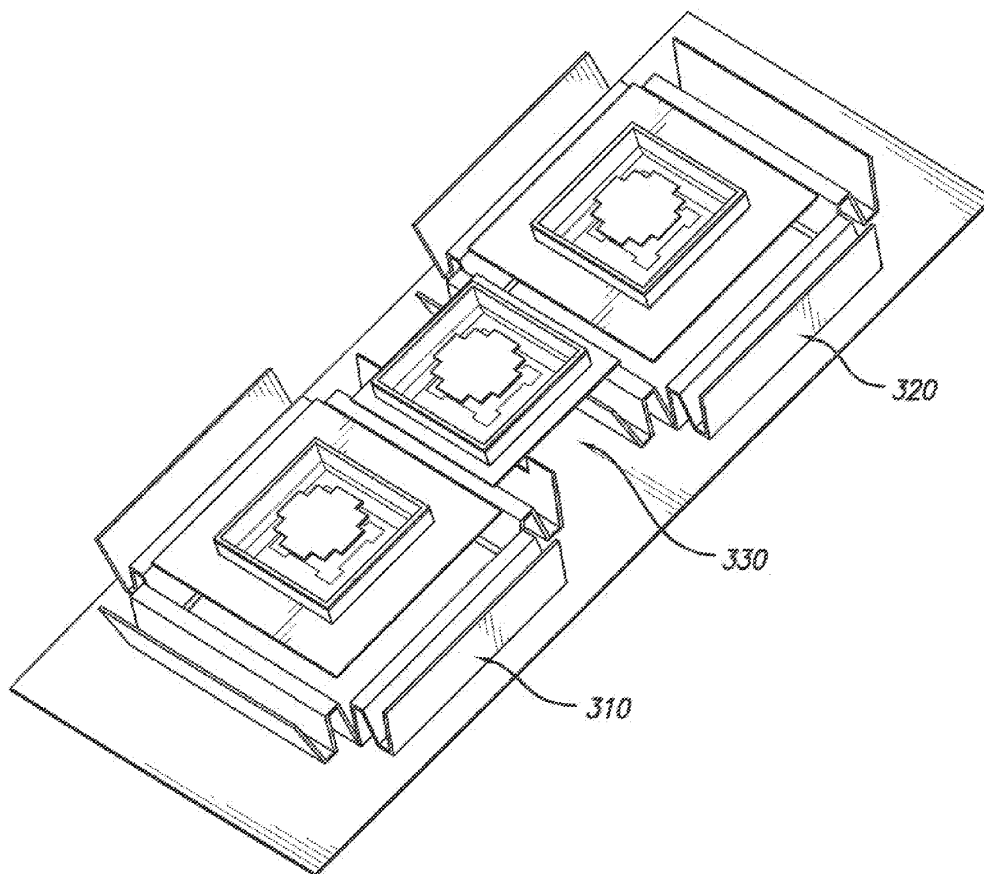
An antenna architecture with a dual-band patch antenna structure having a broadened low-frequency beamwidth is disclosed. The dual band antenna structure comprises a high frequency patch antenna cavity stacked inline above a low frequency patch antenna cavity. An N-shaped metallic wall surrounds the low frequency patch antenna cavity and broadens the emission radiation beamwidth of the low frequency emission. As such, these dual band antenna structures can emit radiation with a beamwidth of approximately 90 degrees in the low frequency band of 700 MHz to 900 MHz as well as the high frequency band of 1.7 GHz to 2.2 GHz.

(21) Appl. No.: **12/754,453**

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

Related U.S. Application Data

(60) Provisional application No. 61/167,097, filed on Apr. 6, 2009.



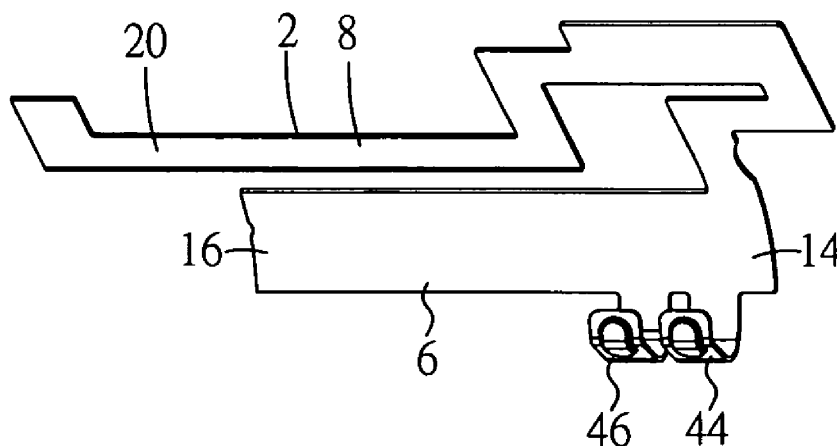
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US 20100289700A1

(19) **United States**(12) **Patent Application Publication**
Yang et al.(10) **Pub. No.: US 2010/0289700 A1**(43) **Pub. Date: Nov. 18, 2010**(54) **MULTI-BAND ANTENNA****Publication Classification**(76) Inventors: **Chung-Wen Yang**, Tu-Cheng City
(TW); **Yu-Yuan Wu**, Tu-Cheng
City (TW); **Hung-Jen Chen**,
Tu-Cheng City (TW)(51) **Int. Cl.**
H01Q 1/38 (2006.01)(52) **U.S. Cl.** **343/700 MS**(57) **ABSTRACT**Correspondence Address:
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3458 ELLICOTT CENTER DRIVE-SUITE 101
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A multi-band antenna includes a first radiator resonating at a high frequency band and a second radiator extended from a first end and toward a second end of the first radiator, and resonating at a low frequency range. An opening slot is formed between the first and the second radiators. A connecting slot and an end slot are formed in the second radiator. The width of the connecting slot is wider than the width of the opening slot. The connecting slot can prevent vectors potential caused by the second radiator from being neutralized. The electromagnetic coupling effect over the opening slot caused by the first radiator and the second radiator can pull down the low frequency range for reducing the size of the second radiator. Therefore, the multi-band antenna has a small size.

(21) Appl. No.: **12/453,572**(22) Filed: **May 15, 2009**100
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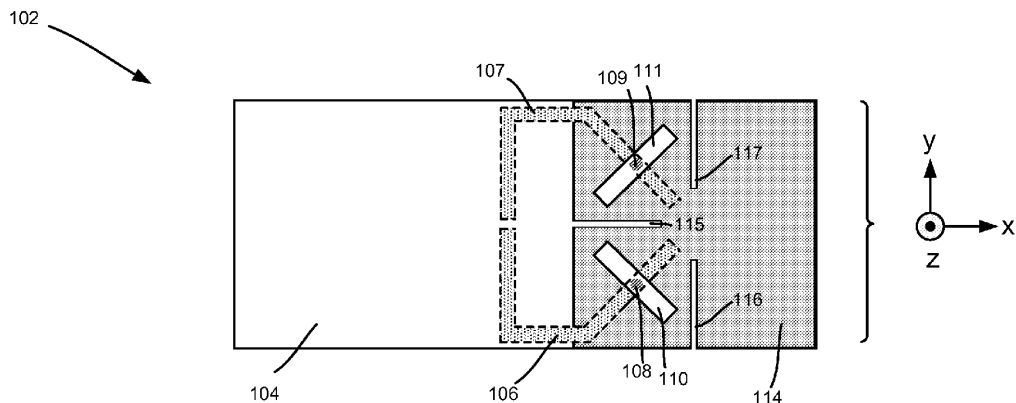
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US 20100289701A1

(19) **United States**(12) **Patent Application Publication**
DeJean et al.(10) **Pub. No.: US 2010/0289701 A1**(43) **Pub. Date: Nov. 18, 2010**(54) **ANTENNA CONFIGURED FOR BANDWIDTH
IMPROVEMENT ON A SMALL SUBSTRATE.****Publication Classification**(75) Inventors: **Gerald Reuben DeJean**, Redmond,
WA (US); **Sean R. Mercer**,
Issaquah, WA (US); **Vasco Rubio**,
Edmonds, WA (US)(51) **Int. Cl.**
H01Q 1/38 (2006.01)(52) **U.S. Cl.** **343/700 MS**(57) **ABSTRACT**Correspondence Address:
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REDMOND, WA 98052 (US)

Described is an antenna having a patch with slits configured to meet specified frequency and bandwidth requirements. For example, for a dual-polarized antenna with two feedlines, the patch has three slits that are configured to determine the antenna's frequency characteristics; the patch has no (or a substantially reduced) fourth slit, thereby providing wider bandwidth. The slits may be sized to provide the desired frequency characteristics. Also described is having the equivalent of variable slits via electronic or mechanical configuration. For diagonal feedlines, the slits may be symmetrically arranged, e.g., one horizontal slit extending from one side of the patch and two vertical slits extending from the upper and lower edges of the patch. The antenna may be used in a device such as a gaming console.

(73) Assignee: **Microsoft Corporation**, Redmond,
WA (US)(21) Appl. No.: **12/466,388**(22) Filed: **May 15, 2009**

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US 20100289702A1

(19) **United States**(12) **Patent Application Publication****LIU et al.**(10) **Pub. No.: US 2010/0289702 A1**(43) **Pub. Date: Nov. 18, 2010**(54) **DUAL-BAND ANTENNA AND PORTABLE WIRELESS COMMUNICATION DEVICE USING THE SAME**(30) **Foreign Application Priority Data**

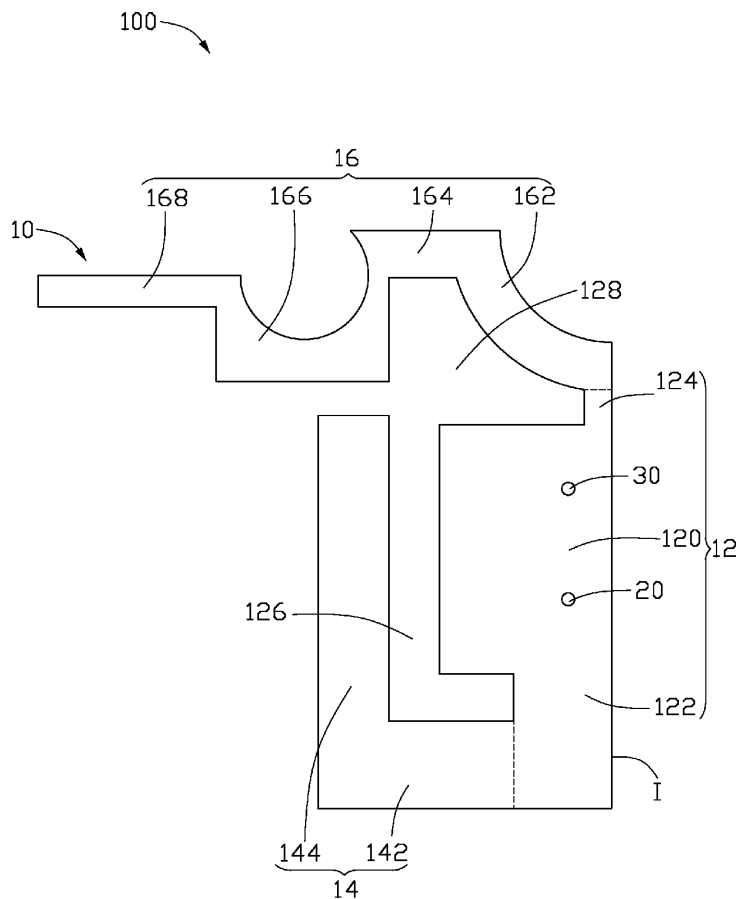
May 15, 2009 (CN) 200910302370.X

Publication Classification(75) Inventors: **HSIN-HUNG LIU**, Tu-Cheng (TW); **TSUNG-LIN HSIEH**, Tu-Cheng (TW); **WEN-HSIU HSU**, Tu-Cheng (TW)(51) **Int. Cl.**
H01Q 1/36 (2006.01)
H01Q 5/00 (2006.01)(52) **U.S. Cl.** **343/700 MS; 343/860**(57) **ABSTRACT**

Correspondence Address:

Altis Law Group, Inc.**ATTN: Steven Reiss****288 SOUTH MAYO AVENUE****CITY OF INDUSTRY, CA 91789 (US)**(73) Assignee: **CHI MEI COMMUNICATION SYSTEMS, INC.**, Tu-Cheng City (TW)(21) Appl. No.: **12/493,342**(22) Filed: **Jun. 29, 2009**

A dual-band antenna used in a portable wireless communication device includes a main antenna body, a feed end, and a grounding end. The feed end and the grounding end are positioned on the main antenna body. The main antenna body includes a matching portion for adjusting the match impedance of the dual-band antenna, a first antenna portion for transmitting/receiving wireless signals in high frequency bands, and a second antenna portion for transmitting/receiving wireless signals in low frequency bands. The first antenna and the second antenna are connected to two opposite ends of the matching portion. The matching portion, the first antenna, and the second antenna are coplanar.



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US 20100289704A1

(19) **United States**(12) **Patent Application Publication**
Yang et al.(10) **Pub. No.: US 2010/0289704 A1**(43) **Pub. Date: Nov. 18, 2010**(54) **ELECTRONIC APPARATUS AND ANTENNA
MODULE THEREOF****Publication Classification**(75) Inventors: **Chun-Fei Yang**, Taipei Hsien
(TW); **Hung-Chih Fu**, Taipei Hsien
(TW)(51) **Int. Cl.**
H01Q 1/24 (2006.01)(52) **U.S. Cl.** **343/702**

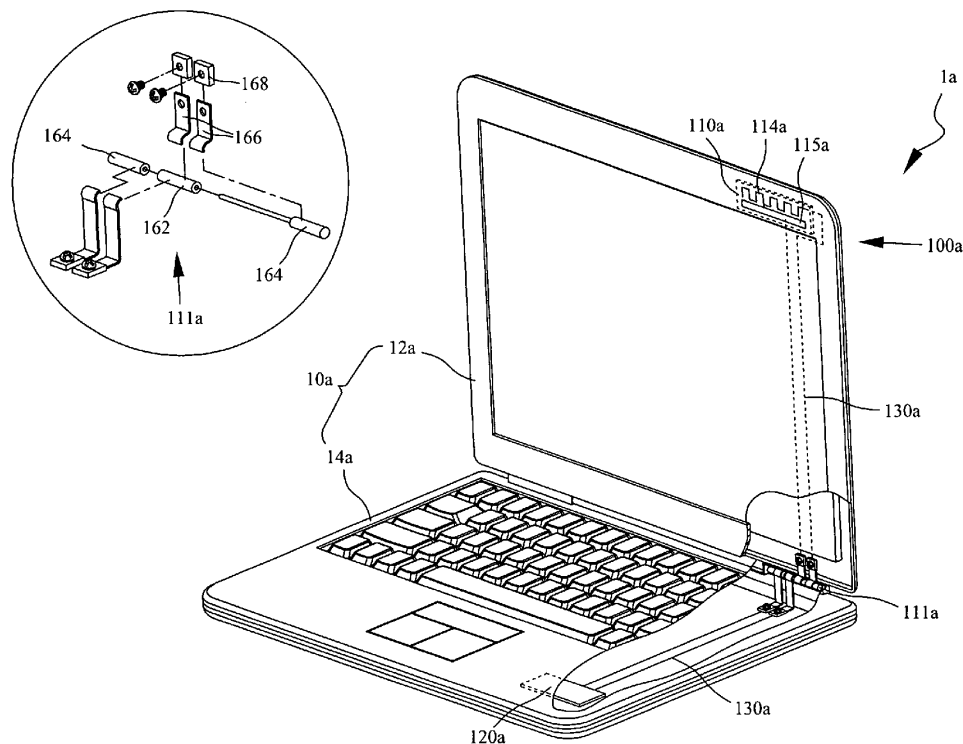
Correspondence Address:

BACON & THOMAS, PLLC
625 SLATERS LANE, FOURTH FLOOR
ALEXANDRIA, VA 22314-1176 (US)(73) Assignee: **Wistron Corporation**, Taipei Hsien
(TW)(21) Appl. No.: **12/461,219**(22) Filed: **Aug. 5, 2009**(30) **Foreign Application Priority Data**

May 14, 2009 (TW) 098116069

(57) **ABSTRACT**

An antenna structure for an electronic apparatus is disclosed. The electronic apparatus comprises a case composed of a first case and a second case, and the first case combines correspondingly with the second case. The antenna structure comprises an antenna element and a system antenna module. The antenna element is disposed on the inner side of the first case and comprises a connection portion. The system antenna module disposed in the case comprises a corresponding connection portion, and the position of the corresponding connection portion corresponds to the connection portion. The connection portion can be in contact with the corresponding connection portion to form an electrical connection between them by combining the first case and the second case.



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US 20100289706A1

(19) **United States**(12) **Patent Application Publication**
Hsieh et al.(10) **Pub. No.: US 2010/0289706 A1**(43) **Pub. Date: Nov. 18, 2010**(54) **WIRELESS COMMUNICATING DEVICE AND
PORTABLE ELECTRONIC APPARATUS
USING THE SAME**(30) **Foreign Application Priority Data**

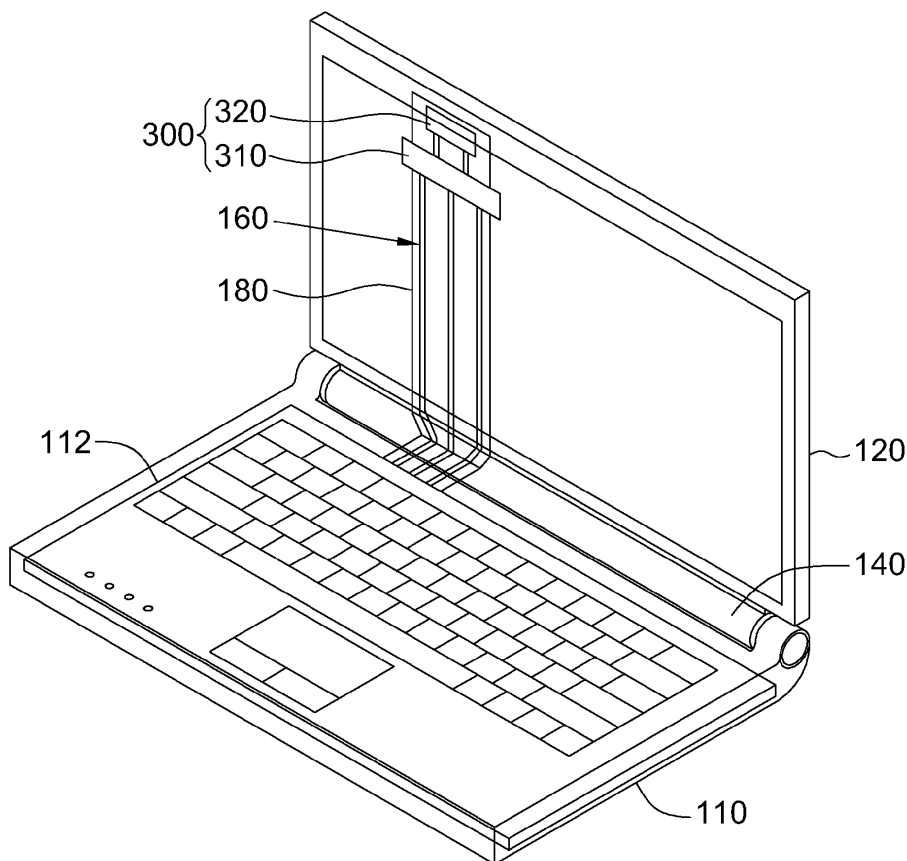
May 18, 2009 (TW) 098116387

Publication Classification(75) Inventors: **Tsung-Ying Hsieh**, Hsinchu City
(TW); **Lee-Cheng Shen**, Hsinchu
City (TW); **Chin-Lien Hsu**,
Hsinchu City (TW)(51) **Int. Cl.**
H01Q 1/24 (2006.01)(52) **U.S. Cl.** **343/702**(57) **ABSTRACT**

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WASHINGTON, DC 20005 (US)(73) Assignee: **Quanta Computer Inc.**, Tao Yuan
Shien (TW)(21) Appl. No.: **12/714,637**(22) Filed: **Mar. 1, 2010**

A portable electronic apparatus is provided which includes a first housing, a second housing, a control unit, a display unit, and a wireless communication device. The two housings are rotatably coupled to each other. The control unit is accommodated in the first housing. The display unit is accommodated in the second housing and is connected to the control unit. The wireless communication device is accommodated in the second housing and has a wireless communication module and an antenna. The wireless communication module is connected to the control unit and the antenna, and is configured to perform wireless communication through the antenna under control of the control unit.



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US 20100289707A1

(19) **United States**(12) **Patent Application Publication**
TAKAMURA(10) **Pub. No.: US 2010/0289707 A1**(43) **Pub. Date: Nov. 18, 2010**(54) **ANTENNA AND RADIO COMMUNICATION**
APPARATUS**Publication Classification**(75) Inventor: **Ayumi TAKAMURA,**
Ishikawa-ken (JP)(51) **Int. Cl.**
H01Q 9/04 (2006.01)
H01Q 1/24 (2006.01)(52) **U.S. CL.** **343/702; 343/700 MS**

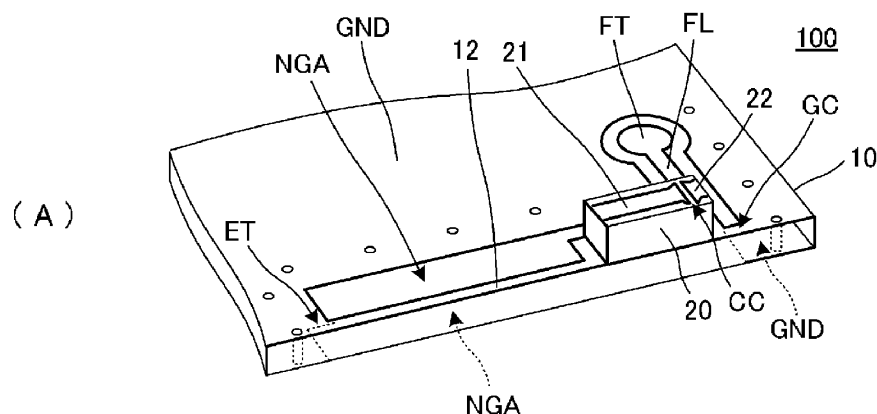
Correspondence Address:

Studebaker & Brackett PC**One Fountain Square, 11911 Freedom Drive, Suite**
750**Reston, VA 20190 (US)**(57) **ABSTRACT**(73) Assignee: **MURATA MANUFACTURING**
CO., LTD., Kyoto-fu (JP)

A ground electrode is formed on upper and lower surfaces of a substrate. Along a part of one side of the substrate, a non-ground area is formed on the upper and lower surfaces of the substrate. In the non-ground area on the upper surface of the substrate, a substrate-side radiation electrode is formed along an edge of the substrate. An earth terminal at one end of the substrate-side radiation electrode is electrically connected to the ground electrode or is grounded. A dielectric-block-side radiation electrode and a capacitance forming electrode are formed on a dielectric block. There is a capacitive coupling portion in an inter-electrode gap between an end of the dielectric-block-side radiation electrode and an end of the capacitance forming electrode. A capacitor is connected in series in the middle of the substrate-side radiation electrode.

(21) Appl. No.: **12/779,748**(22) Filed: **May 13, 2010**(30) **Foreign Application Priority Data**

May 14, 2009 (JP) 2009-117302



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US 20100289708A1

(19) **United States**(12) **Patent Application Publication****Bungo et al.**(10) **Pub. No.: US 2010/0289708 A1**(43) **Pub. Date: Nov. 18, 2010**(54) **ANTENNA DEVICE AND COMMUNICATION APPARATUS**(75) Inventors: **Akihiro Bungo**, Tokyo (JP); **Takao Yokoshima**, Tokyo (JP); **Shinsuke Yukimoto**, Tokyo (JP); **Toshiaki Edamatsu**, Chichibu-gun (JP)Correspondence Address:
Leason Ellis LLP
81 Main Street, Suite 503
White Plains, NY 10601 (US)(73) Assignee: **Mitsubishi Materials Corporation**, Tokyo (JP)(21) Appl. No.: **12/788,749**(22) Filed: **May 27, 2010****Related U.S. Application Data**

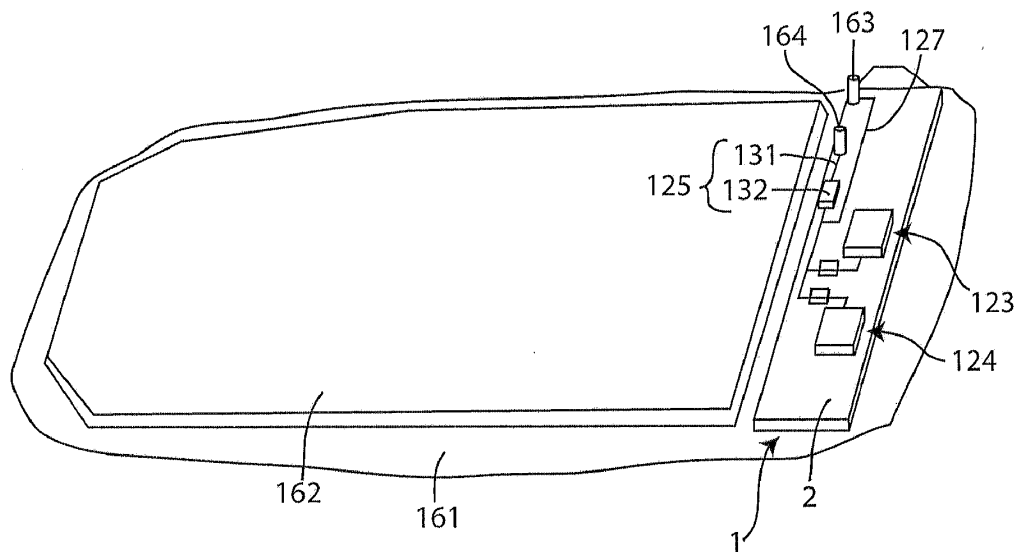
(62) Division of application No. 10/596,812, filed on Jul. 19, 2007, now Pat. No. 7,777,677, filed as application No. PCT/JP04/19337 on Dec. 24, 2004.

(30) **Foreign Application Priority Data**

Dec. 25, 2003	(JP)	2003-430022
Mar. 12, 2004	(JP)	2004-070875
Mar. 12, 2004	(JP)	2004-071513
Aug. 4, 2004	(JP)	2004-228157
Aug. 31, 2004	(JP)	2004-252435
Oct. 18, 2004	(JP)	2004-302924

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

There is provided an antenna device including a substrate, an earth section which is disposed on a portion of the substrate, a feed point which is disposed on the substrate, a loading section disposed on the substrate and constructed with a line-shaped conductor pattern which is formed in a longitudinal direction of an elementary body made of a dielectric material, an inductor section which connects one end of the conductor pattern to the earth section, and a feed point which feeds a current to a connection point of the one end of the conductor pattern and the inductor section, wherein a longitudinal direction of the loading section is arranged to be parallel to an edge side of the earth section.



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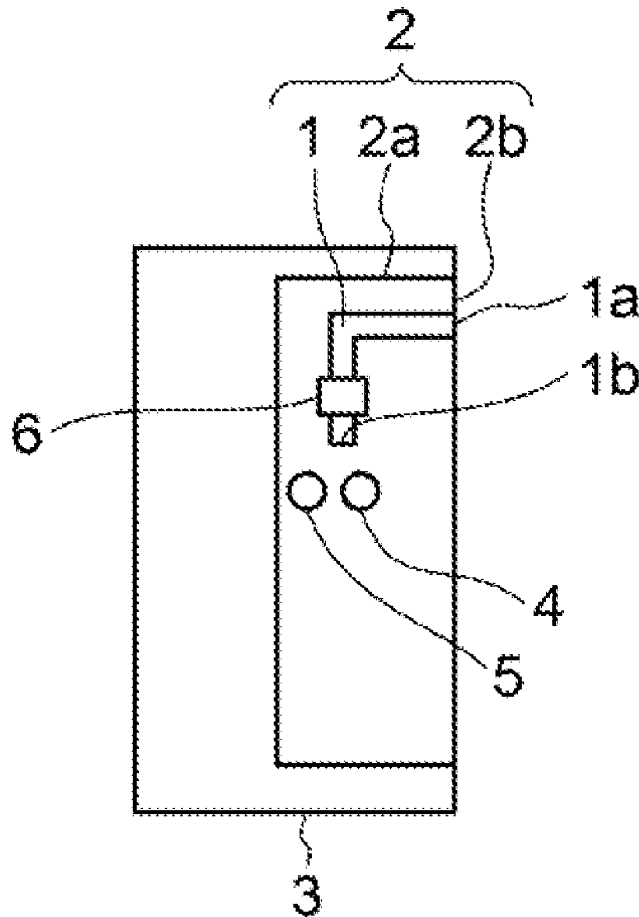
US 20100289713A1

(19) **United States**(12) **Patent Application Publication**
TAURA(10) **Pub. No.: US 2010/0289713 A1**(43) **Pub. Date: Nov. 18, 2010**(54) **SLOT ANTENNA****Publication Classification**(76) Inventor: **TORU TAURA**, Tokyo (JP)(51) **Int. Cl.**
H01Q 13/10 (2006.01)Correspondence Address:
Mr. Jackson Chen
6535 N. STATE HWY 161
IRVING, TX 75039 (US)(52) **U.S. Cl.** **343/767**(21) Appl. No.: **12/600,220**(57) **ABSTRACT**(22) PCT Filed: **Apr. 23, 2008**(86) PCT No.: **PCT/JP2008/057818**§ 371 (c)(1),
(2), (4) Date: **Nov. 13, 2009**

To realize an antenna made thinner. A slot antenna includes: an antenna element having an aperture slit shaped slot; a reflector disposed by being opposed to the antenna element; a feeding device which is electrically and physically connected to the antenna element and the reflector; a short-circuiting device which electrically short-circuits the antenna element and the reflector; and a frequency switching device, which is provided on the slot, for switching resonance frequencies of the slot. The impedance generated by the approach between the antenna element and the reflector can be improved to prevent mismatching and the distance therebetween can be reduced to make an antenna thinner.

(30) **Foreign Application Priority Data**

May 16, 2007 (JP) 2007-130857



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US 20100289717A1

(19) **United States**(12) **Patent Application Publication****Arslan et al.**(10) **Pub. No.: US 2010/0289717 A1**(43) **Pub. Date: Nov. 18, 2010**(54) **RECONFIGURABLE ANTENNA**(30) **Foreign Application Priority Data**

(75) Inventors: **Tughrul Arslan**, Edinburgh (GB);
Anthony John Walton, Edinburgh
(GB); **Nakul R. Haridas**,
Edinburgh (GB); **Ahmed Osman**
El-Rayis, Edinburgh (GB)

Jun. 13, 2007 (GB) 0711382.2

Publication Classification

(51) **Int. Cl.**
H01Q 3/30 (2006.01)
H01Q 1/38 (2006.01)
H01Q 3/24 (2006.01)

(52) **U.S. Cl.** **343/876; 343/700 MS**

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EDINBURGH, Edinburgh (GB)

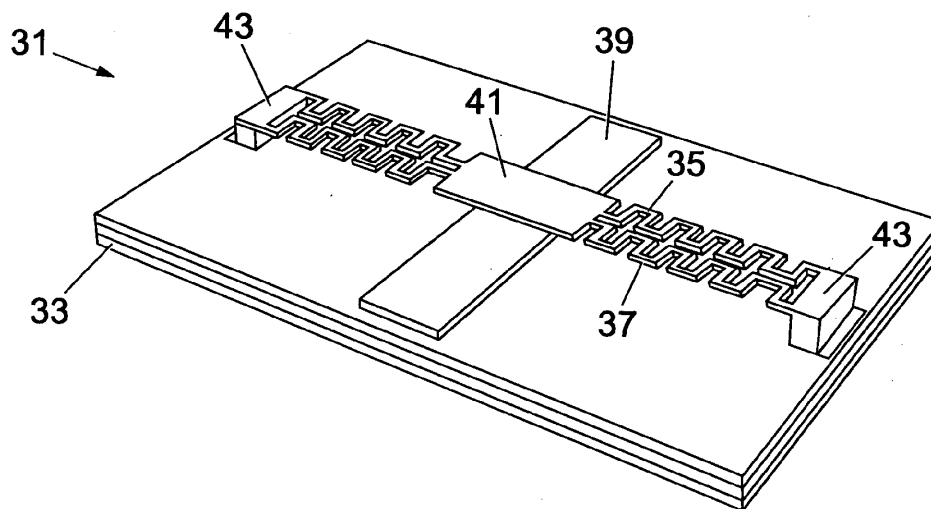
(57) **ABSTRACT**(21) Appl. No.: **12/663,803**(22) PCT Filed: **Jun. 13, 2008**(86) PCT No.: **PCT/GB2008/050448**

§ 371 (c)(1),
(2), (4) Date: **Jul. 7, 2010**

Related U.S. Application Data

(60) Provisional application No. 60/934,401, filed on Jun.
13, 2007.

A micro electromechanical (MEMS) antenna (36) is positioned on one side of a substrate and is connected to a MEMS switch comprising a capacitor bridge (46) and to a transmission line (42) by means of a thru hole or via (48) which forms an electrically conducting path through the substrate. This arrangement provides a common ground plane for the antenna and switch and shields the switch from the electromagnetic radiation received or transmitted from the antenna. The switch may comprise a topmost metal layer which extends across a bridge structure formed by a polymer layer (19). The polymer layer comprises poly-monochloro-para-xylene (parylene-C). Homogeneous or heterogeneous antenna array structures are implemented. The antenna arrays may include one or more different type of antennas with for example different shapes, rotations and reflections.



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US 20100295735A1

(19) **United States**(12) **Patent Application Publication****Fu et al.**(10) **Pub. No.: US 2010/0295735 A1**(43) **Pub. Date: Nov. 25, 2010**(54) **BROADBAND ANTENNA****Publication Classification**

(75) Inventors: **Kuo-Chan Fu**, Taipei County (TW); **Tsung-Wen Chiu**, Taipei County (TW); **Fu-Ren Hsiao**, Taipei County (TW); **Wen-His Lee**, Taipei County (TW)

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

(52) **U.S. Cl.** **343/700 MS; 343/848**

(57) **ABSTRACT**

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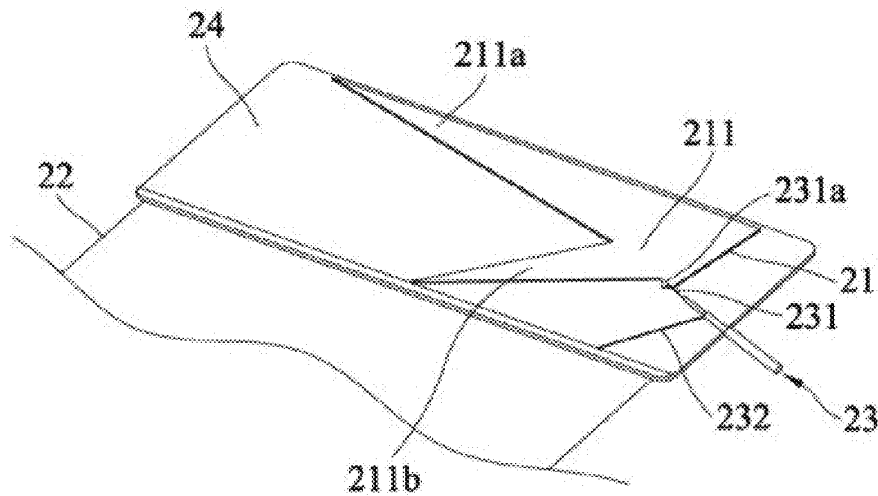
(21) Appl. No.: **12/559,354**

(22) Filed: **Sep. 14, 2009**

(30) **Foreign Application Priority Data**

May 22, 2009 (TW) 098117029

The present invention discloses a broadband antenna, which comprises a radiation conductor, a grounding plane and a feeder cable. The radiation conductor has an inverse V shape. The radiation conductor has an elbow portion; a first leg and a second leg respectively extend from the elbow portion toward two different directions. A terminal of the second leg connects with the grounding plane. The feeder cable has a central wire and an external wire. The central wire connects with the second leg. The external wire connects with the grounding plane. The present invention is characterized in that only a single inverse V-shaped radiation conductor is enough to generate a baseband resonant mode and a frequency multiplication resonant mode for the antenna system, and that the present invention has a simple structure and needn't use a short-circuit member.



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US 20100295736A1

(19) **United States**(12) **Patent Application Publication**
SU(10) **Pub. No.: US 2010/0295736 A1**(43) **Pub. Date: Nov. 25, 2010**(54) **BUILT-IN MULTI-ANTENNA MODULE****Publication Classification**(75) **Inventor:** Saou-Wen SU, Taipei City (TW)(51) **Int. Cl.**
H01Q 1/38 (2006.01)(52) **U.S. Cl.** 343/700 MS

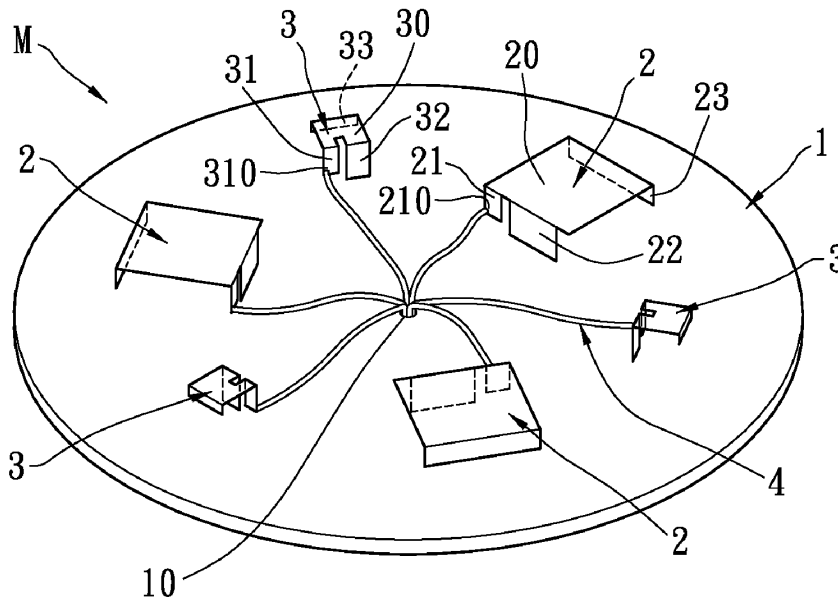
Correspondence Address:

RABIN & Berdo, PC
1101 14TH STREET, NW, SUITE 500
WASHINGTON, DC 20005 (US)(57) **ABSTRACT**(73) **Assignees:** **SILITEK ELECTRONIC**
(GUANGZHOU) CO., LTD.,
Guangzhou (CN); **LITE-ON**
TECHNOLOGY
CORPORATION, Taipei City
(TW)

A built-in multi-antenna module includes a grounding unit, a plurality of first radiating units and a plurality of second radiating units. The first and the second radiating units are disposed on the grounding unit. Each first radiating unit has a first radiating body, a first feeding pin extended downwards from the first radiating body, and a first shorting pin extended downwards from the first radiating body and connected to the grounding unit. Each second radiating unit has a second radiating body, a second feeding pin extended downwards from the second radiating body, and a second shorting pin extended downwards from the second radiating body and connected to the grounding unit. The first radiating units and the second radiating units are alternately and symmetrically arranged on the grounding unit, and many included angles respectively formed between each first radiating unit and each second radiating unit are the same.

(21) **Appl. No.:** 12/559,748(22) **Filed:** Sep. 15, 2009(30) **Foreign Application Priority Data**

May 20, 2009 (CN) 200910203713.7



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US 20100295750A1

(19) **United States**(12) **Patent Application Publication****See et al.**(10) **Pub. No.: US 2010/0295750 A1**(43) **Pub. Date: Nov. 25, 2010**(54) **ANTENNA FOR DIVERSITY APPLICATIONS****Related U.S. Application Data**(75) Inventors: **Shie Ping Terence See**, Singapore (SG); **Zhining Chen**, Singapore (SG)

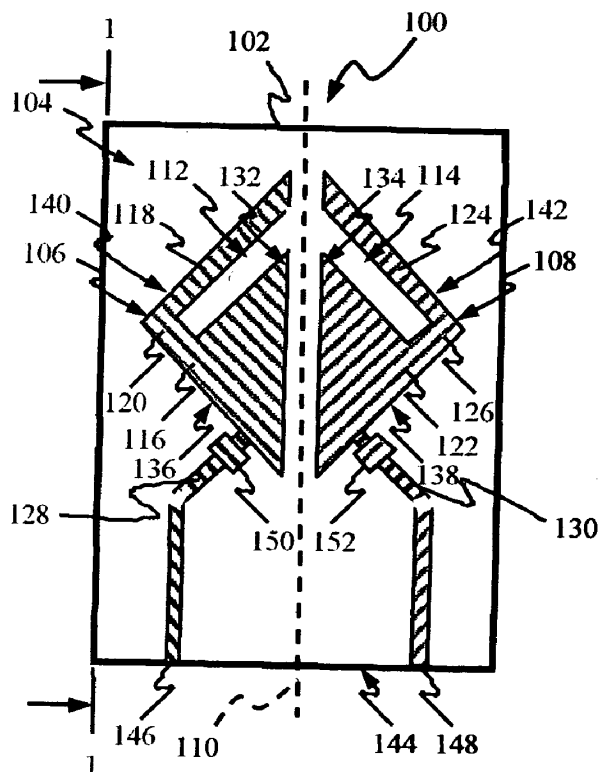
(60) Provisional application No. 60/978,429, filed on Oct. 9, 2007.

Publication Classification(51) **Int. Cl.**
H01Q 21/24 (2006.01)(52) **U.S. Cl.** **343/893**(57) **ABSTRACT**

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21 Science Park Road, #03-01 The Aquarius Sci-
ence Park II
SINGAPORE 117628 (SG)(73) Assignee: **Agency for Science, Technology and Research**, Singapore (SG)(21) Appl. No.: **12/734,083**(22) PCT Filed: **Oct. 9, 2008**(86) PCT No.: **PCT/SG2008/000388**§ 371 (c)(1),
(2), (4) Date:**Jul. 8, 2010**

An antenna for ultra-wideband applications is disclosed. The antenna has a first radiating element shaped for defining a first notch, the first radiating element having a first feeding structure. The antenna further has a second radiating element operatively couplable to the first radiating element and shaped for defining a second notch. The second radiating element having a second feeding structure, the first and second feeding structures being substantially orthogonal to each other and the first and second radiating elements having an inter-displacement. More specifically, the first radiating element and the first feeding structure is substantially symmetrical to the second radiating element and the second feeding structure respectively about a line of symmetry passing through the inter-displacement between the first and second radiating elements for achieving orthogonal polarization and radiating pattern diversity between the first and second radiating elements.



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US 20100298027A1

(19) **United States**

(12) **Patent Application Publication**
Yun

(10) **Pub. No.: US 2010/0298027 A1**

(43) **Pub. Date: Nov. 25, 2010**

(54) **ANTENNA APPARATUS OF MOBILE
TERMINAL**

(30) **Foreign Application Priority Data**

May 21, 2009 (KR) 10-2009-0044377

(75) Inventor: **Ju Hwan Yun**, Gyeongsangbuk-do
(KR)

Publication Classification

(51) **Int. Cl.**
H04M 1/00 (2006.01)
H01Q 1/24 (2006.01)
H05K 13/00 (2006.01)

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PARAMUS, NJ 07652 (US)

(52) **U.S. Cl. 455/553.1; 343/702; 29/600**

(57) **ABSTRACT**

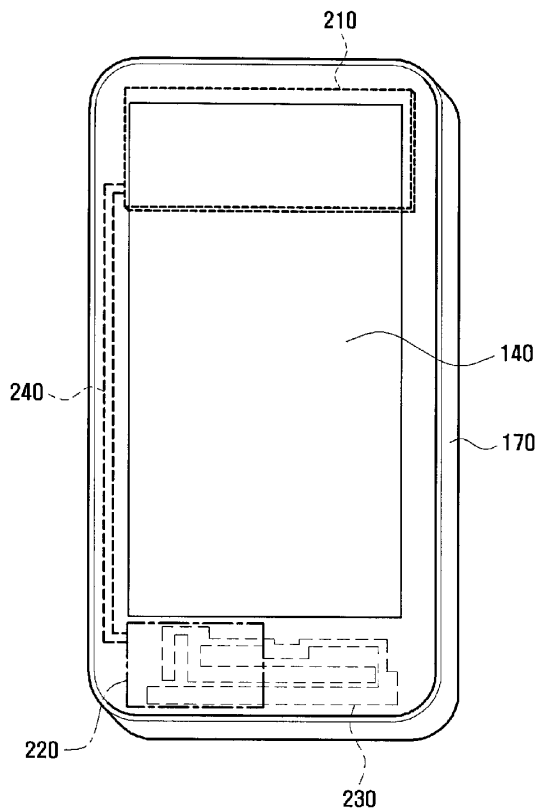
(73) Assignee: **SAMSUNG ELECTRONICS
CO., LTD.**, Gyeonggi-Do (KR)

A mobile terminal and manufacture of same are provided. The mobile terminal includes: an antenna; a first case at which the antenna is disposed; a second case coupled to the first case; a main PCB disposed at one side of the second case; and a sub-PCB disposed at an opposite side of the second case, the sub-PCB being connected to the main PCB through a cable, wherein the sub-PCB is electrically coupled with the antenna when the first case and the second case are coupled together.

(21) Appl. No.: **12/782,775**

(22) Filed: **May 19, 2010**

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