



US 20100001907A1

(19) **United States**

(12) **Patent Application Publication**  
**Wan**

(10) **Pub. No.: US 2010/0001907 A1**

(43) **Pub. Date: Jan. 7, 2010**

(54) **COMPACT PLANAR ANTENNA ASSEMBLY**

**Publication Classification**

(75) **Inventor: Tze Chung Wan, Taoyuan Hsien (TW)**

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

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

(57) **ABSTRACT**

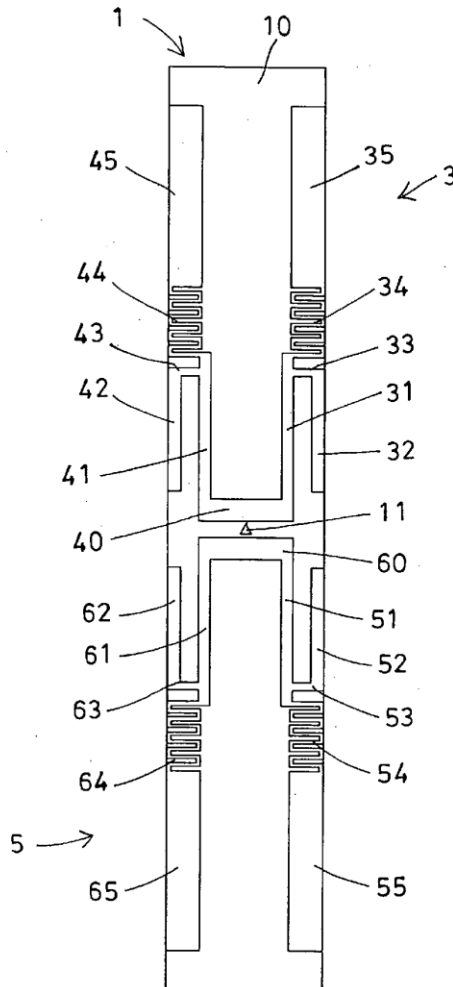
Correspondence Address:  
**CHARLES E. BAXLEY, ESQUIRE**  
**90 JOHN STREET, SUITE 309**  
**NEW YORK, NY 10038 (US)**

An antenna assembly includes a substrate having a feed line, and an antenna device having two inner radiators electrically coupled to the feed line and disposed at a distance from each other, and two outer radiators electrically coupled to the middle portions of the inner radiators for decreasing the dimension of the antenna assembly and for increasing the gain of the antenna assembly, the inner radiators each include an antenna segment disposed at a distance parallel to the inner radiators and disposed on an outer portion of the inner radiators, the inner radiators are electrically coupled to the outer radiators with a coupling element which includes either a zigzag shape or a wave-shaped structure.

(73) **Assignee: Joymax Electronics Co., Ltd.**

(21) **Appl. No.: 12/217,079**

(22) **Filed: Jul. 1, 2008**





US 20100001908A1

(19) **United States**

(12) **Patent Application Publication**  
**Chen**

(10) **Pub. No.: US 2010/0001908 A1**

(43) **Pub. Date: Jan. 7, 2010**

(54) **DIGITAL TELEVISION ANTENNA**

**Publication Classification**

(75) Inventor: **Yen-Yu Chen**, Chung Ho City  
(TW)

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

Correspondence Address:  
**THOMAS, KAYDEN, HORSTEMEYER & RIS-  
LEY, LLP**  
600 GALLERIA PARKWAY, S.E., STE 1500  
ATLANTA, GA 30339-5994 (US)

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

(73) Assignee: **AVERMEDIA  
TECHNOLOGIES, INC.**, Chung  
Ho City (TW)

(57) **ABSTRACT**

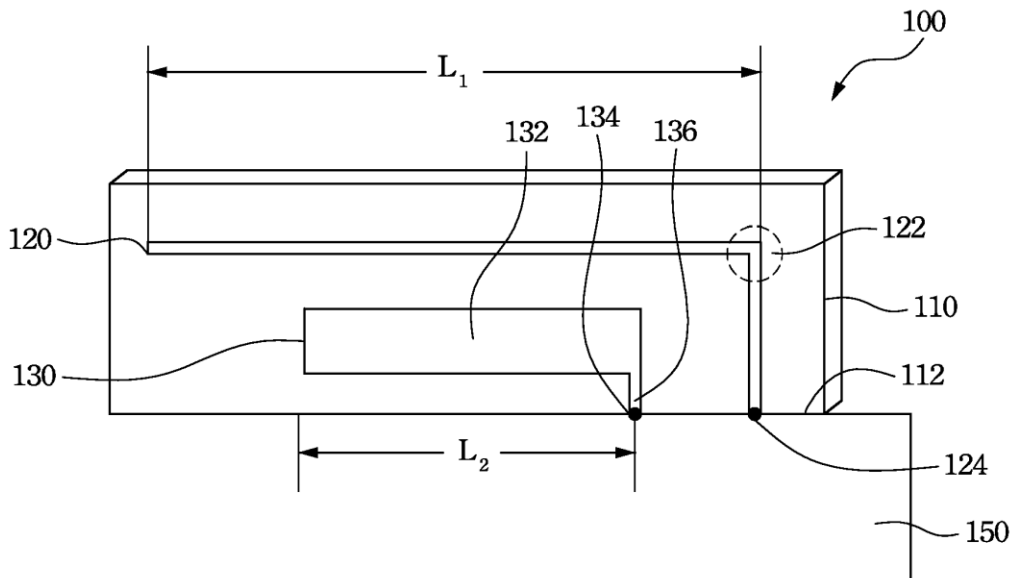
A digital television antenna built in a portable device. The portable device has a system ground board. The digital television antenna includes a parasitic arm and a signal feeding arm. The parasitic arm has a ground point and at least one bending portion. The shape of the parasitic arm is a step-like form. The ground point of the parasitic arm touches the system ground board of the portable device. The signal feeding arm has a main portion and a feeding terminal for receiving a digital television signal with a frequency from 470 MHz to 870 MHz. The shape of the main portion is approximate to a rectangle.

(21) Appl. No.: **12/358,478**

(22) Filed: **Jan. 23, 2009**

(30) **Foreign Application Priority Data**

Jul. 1, 2008 (TW) ..... 97124739





US 20100001913A1

(19) **United States**

(12) **Patent Application Publication**  
**MOSER**

(10) **Pub. No.: US 2010/0001913 A1**

(43) **Pub. Date: Jan. 7, 2010**

(54) **BROADBAND ANTENNA**

**Publication Classification**

(75) Inventor: **Michael MOSER**, Hagersten (SE)

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

Correspondence Address:

**WARREN A. SKLAR (SOER)**  
**RENNER, OTTO, BOISSELLE & SKLAR, LLP**  
**1621 EUCLID AVENUE, 19TH FLOOR**  
**CLEVELAND, OH 44115 (US)**

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

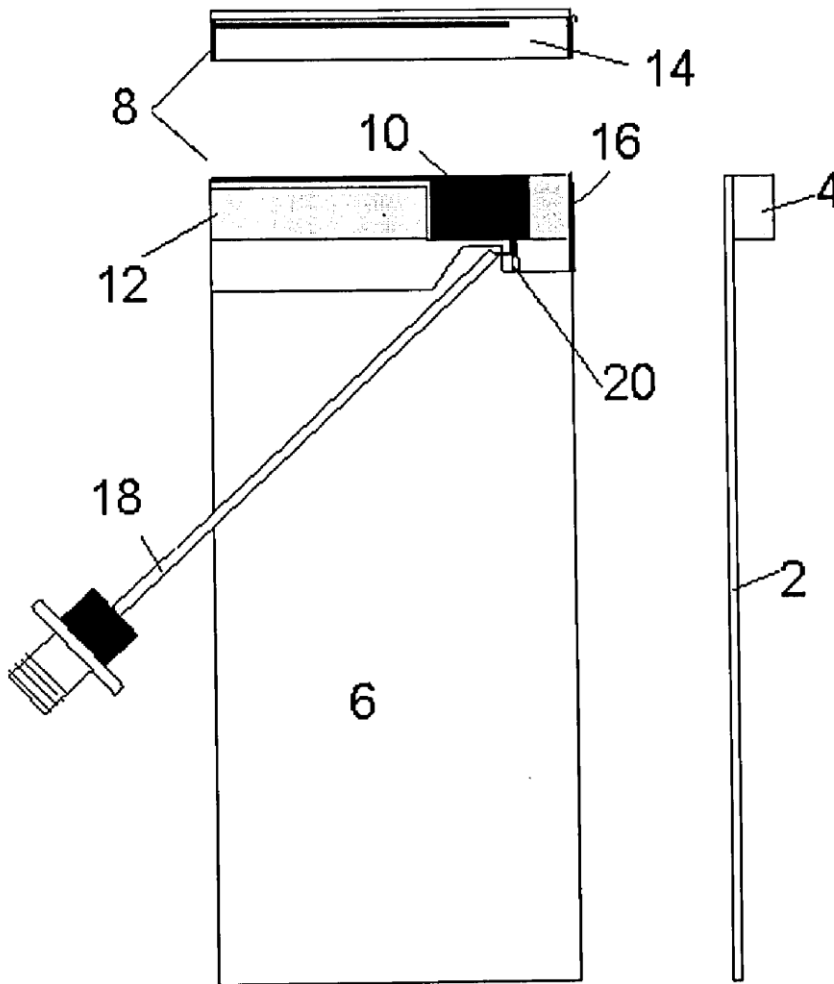
(57) **ABSTRACT**

(73) Assignee: **SONY ERICSSON MOBILE COMMUNICATIONS AB**, Lund (SE)

The present invention relates to a broadband antenna for at least six frequency bands provided on an isolating antenna support structure comprising. The antenna comprises a low band branch and a high band branch coupled to a substantially rectangular ground plane provided on a PCB. The coupling between the ground plane and the low band branch is a capacitive coupling and has a vertical distance of 3-7 mm there in between.

(21) Appl. No.: **12/167,420**

(22) Filed: **Jul. 3, 2008**





US 20100007559A1

(19) **United States**

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

(10) **Pub. No.: US 2010/0007559 A1**

(43) **Pub. Date: Jan. 14, 2010**

(54) **SHORTED MONOPOLE ANTENNA**

**Publication Classification**

(76) Inventors: **Saou-Wen Su**, Taipei City (TW);  
**Jui-Hong Chou**, Taichung City (TW)

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

(57) **ABSTRACT**

Correspondence Address:  
**ROSENBERG, KLEIN & LEE**  
3458 ELLICOTT CENTER DRIVE-SUITE 101  
ELLICOTT CITY, MD 21043 (US)

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

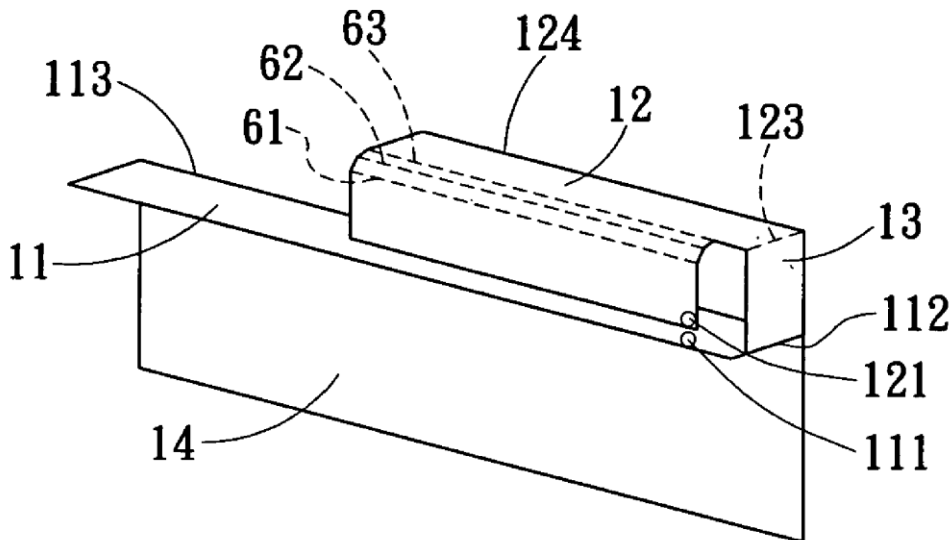
(21) Appl. No.: **12/230,302**

(22) Filed: **Aug. 27, 2008**

(30) **Foreign Application Priority Data**

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

1





US 20100007575A1

(19) **United States**

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

(10) **Pub. No.: US 2010/0007575 A1**

(43) **Pub. Date: Jan. 14, 2010**

(54) **COUPLED-LOOP CHIP ANTENNA**

**Publication Classification**

(75) Inventors: **Yueh-Lin TSAI**, Hsinchu (TW);  
**Meng Hsueh TSAI**, Hsinchu (TW);  
**Chin Huang CHENG**, Hsinchu (TW)

(51) **Int. Cl.**  
**H01Q 7/00** (2006.01)  
**H01Q 1/38** (2006.01)  
(52) **U.S. Cl.** ..... **343/866; 343/700 MS**

Correspondence Address:  
**SEYFARTH SHAW LLP**  
**131 S. DEARBORN ST., SUITE 2400**  
**CHICAGO, IL 60603-5803 (US)**

(57) **ABSTRACT**

A loop antenna for communication is provided, which includes a microwave substrate, being a hexahedron; a first conductive layer, disposed on an upper surface of the substrate for forming a first loop; a second conductive layer, disposed on a first side surface of the substrate, and electrically connected to a feed-in point and a ground point; and a third conductive layer, disposed on a lower surface of the substrate for forming a second loop. The first conductive layer and the second conductive layer are electrically connected at the junction between the upper surface and the first side surface, and the second conductive layer and the third conductive layer are electrically connected at the junction between the first side surface and the lower surface. The antenna also has an appropriate bandwidth for wireless communication application.

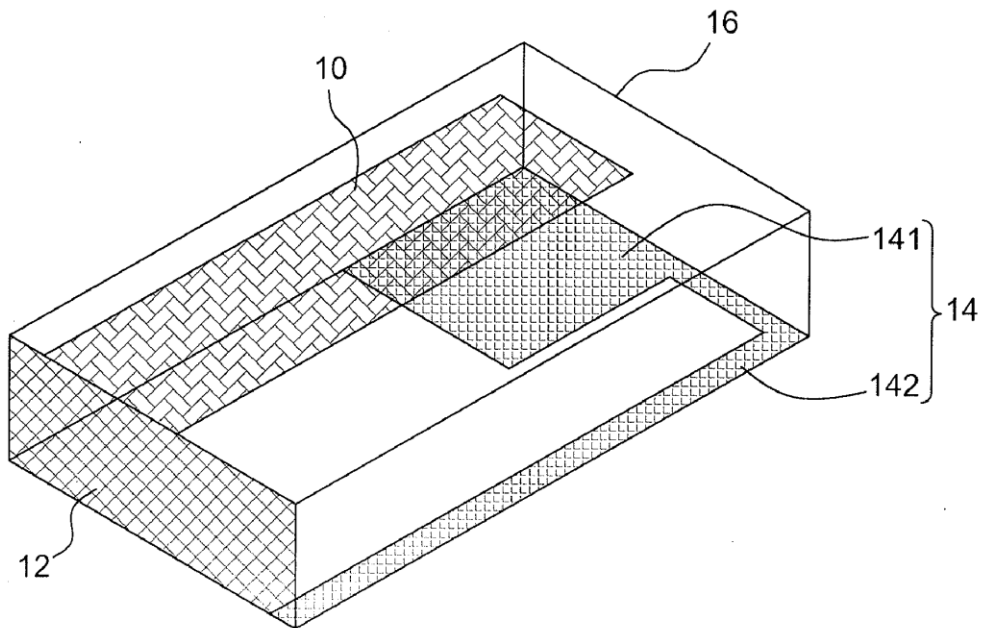
(73) Assignee: **Inpaq Technology Co., Ltd.**

(21) Appl. No.: **12/355,147**

(22) Filed: **Jan. 16, 2009**

(30) **Foreign Application Priority Data**

Jul. 8, 2008 (TW) ..... 097125755





US 20100013713A1

(19) **United States**

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

(10) **Pub. No.: US 2010/0013713 A1**

(43) **Pub. Date: Jan. 21, 2010**

(54) **MULTIPLE FREQUENCY BAND ANTENNA**

**Publication Classification**

(75) Inventors: **Huang-Tse Peng**, Taipei (TW);  
**Kuo-Jen Lai**, Taipei (TW); **E-Den Hsiao**, Taipei (TW)

(51) **Int. Cl.**  
**H01Q 5/00** (2006.01)  
**H01Q 9/04** (2006.01)  
(52) **U.S. Cl.** ..... **343/700 MS**

(57) **ABSTRACT**

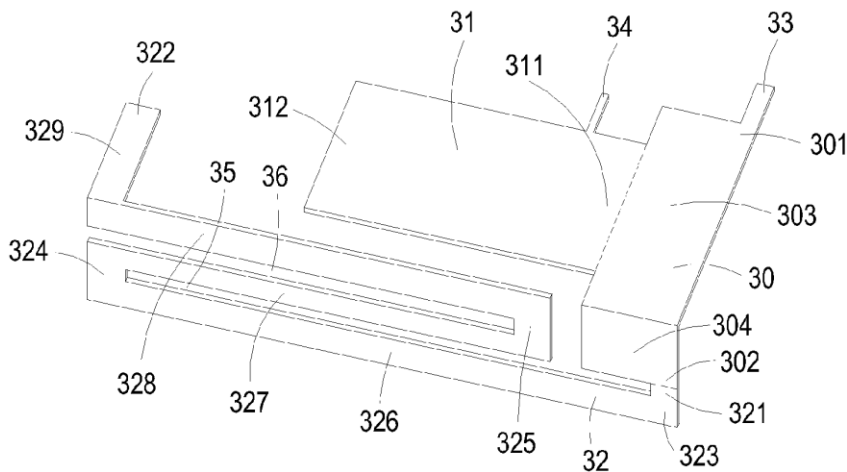
Correspondence Address:  
**KIRTON AND MCCONKIE**  
**60 EAST SOUTH TEMPLE., SUITE 1800**  
**SALT LAKE CITY, UT 84111 (US)**

A multiple frequency band antenna includes a common connecting element, a first radiating element, a second radiating element, a common feeding point and a common ground terminal. The common connecting element includes a connecting part and a turning part, which are arranged in different planes. The first radiating element is connected with the connecting part of the common connecting element. The second radiating element is connected with the turning part of the common connecting element. The second radiating element has a longer path length compared with the first radiating element. A combination of the common connecting element and the first radiating element is configured to transmit and receive wireless signals in a first frequency band. A combination of the common connecting element and the second radiating element is configured to transmit and receive wireless signals in a second frequency band.

(73) Assignee: **ARIMA COMMUNICATIONS CO., LTD.**, Taipei County (TW)

(21) Appl. No.: **12/173,421**

(22) Filed: **Jul. 15, 2008**





US 20100013714A1

(19) **United States**

(12) **Patent Application Publication**  
**AZHARI**

(10) **Pub. No.: US 2010/0013714 A1**

(43) **Pub. Date: Jan. 21, 2010**

(54) **ANTENNA ARRANGEMENT**

**Publication Classification**

(75) Inventor: **Alexander AZHARI**, Stockholm (SE)

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

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

Correspondence Address:  
**HARRITY & HARRITY, LLP**  
**11350 RANDOM HILLS ROAD, SUITE 600**  
**FAIRFAX, VA 22030 (US)**

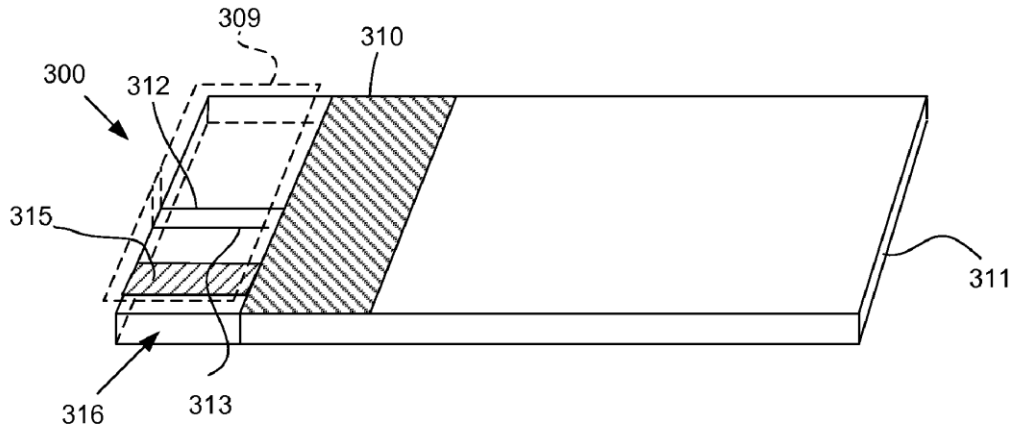
(57) **ABSTRACT**

An antenna for a wireless communication may include a ground plane provided on a carrying structure, a feed element, and a radiating element coupled to the feed element, the radiating element being substantially parallel to and vertically displaced from the ground plane by the feed element and a shortening element. The antenna may also include a parasitic element provided directly on the carrying structure as part of the carrying structure ground layer.

(73) Assignee: **Sony Ericsson Mobile Communications AB**, Lund (SE)

(21) Appl. No.: **12/175,784**

(22) Filed: **Jul. 18, 2008**





US 20100013715A1

(19) **United States**

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

(10) **Pub. No.: US 2010/0013715 A1**

(43) **Pub. Date: Jan. 21, 2010**

(54) **ANTENNA**

**Publication Classification**

(75) Inventors: **Chao-Hui YU**, Tu-Cheng City (TW); **Hung-Jen Chen**, Tu-Cheng City (TW); **Yu-Yuan Wu**, Tu-Cheng City (TW); **Chih-Kuo Wang**, Tu-Cheng City (TW)

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

(57) **ABSTRACT**

An antenna includes a first radiating conductor and a second radiating conductor. The first radiating conductor defines a first edge, a second edge and a lateral edge connecting the first edge and the second edge. The second radiating conductor has a main body spaced away from the second edge and connected to an end of the first radiating conductor far away from the lateral edge by a first connecting portion and extending towards the lateral edge. A free end of the main body bends to the second edge to form a second connecting portion spaced away from the lateral edge. A radiating end bends oppositely to the first radiating conductor from an end of the second connecting portion and is adjacent to the second edge. A feeding conductor and a grounding conductor are connected to an edge of the first radiating conductor different from the first edge and the lateral edge.

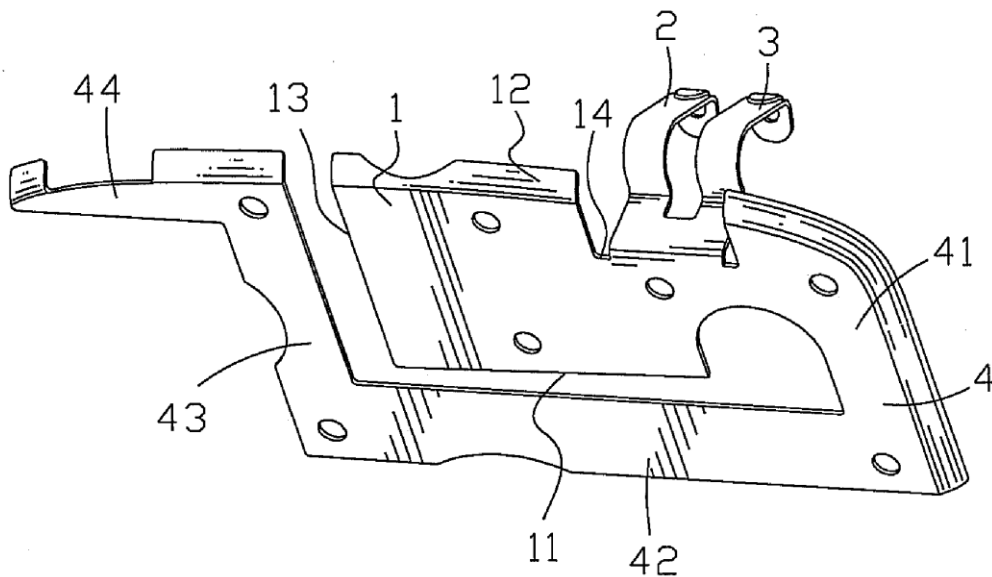
Correspondence Address:  
**Muncy, Geissler, Olds & Lowe, PLLC**  
**P.O. BOX 1364**  
**FAIRFAX, VA 22038-1364 (US)**

(73) Assignee: **Cheng Uei Precision Industry Co., Ltd.**

(21) Appl. No.: **12/176,652**

(22) Filed: **Jul. 21, 2008**

100







US 20100013716A1

(19) **United States**

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

(10) **Pub. No.: US 2010/0013716 A1**

(43) **Pub. Date: Jan. 21, 2010**

(54) **MULTI-FREQUENCY ANTENNA AND AN ELECTRONIC DEVICE HAVING THE MULTI-FREQUENCY ANTENNA**

**Publication Classification**

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

(75) **Inventors:** **Li-Jean Yen**, Taipei Hsien (TW);  
**Chia-Tien Li**, Taipei Hsien (TW)

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

Correspondence Address:  
**BACON & THOMAS, PLLC**  
**625 SLATERS LANE, FOURTH FLOOR**  
**ALEXANDRIA, VA 22314-1176 (US)**

(57) **ABSTRACT**

A multi-frequency antenna and an electronic device having the multi-frequency antenna are disclosed. The multi-frequency antenna comprises: a first radiating element including a first end and a second end; a grounding element connected to the first end of the first radiating element; a feeding structure for inputting an electrical signal to the first radiating element; and a second radiating element including a first end and a second end. The first end of the second radiating element includes a transitional portion; and the second radiating element is connected to the second end of the first radiating element by the transitional portion. So that the first radiating element forms a first current path to generate a first resonant mode; and the second radiating element forms a second current path to generate a second resonant mode.

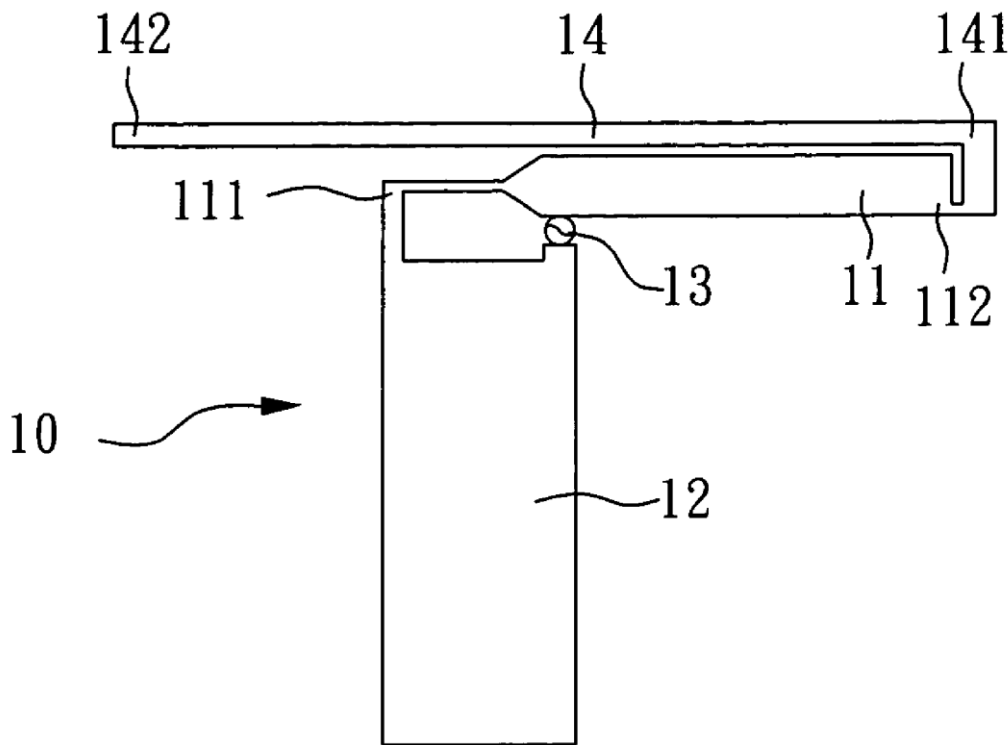
(73) **Assignee:** **WISTRON NEWEB CORP.**,  
Taipei Hsien (TW)

(21) **Appl. No.:** **12/385,027**

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

(30) **Foreign Application Priority Data**

Jul. 15, 2008 (TW) ..... 097126771





US 20100013717A1

(19) **United States**  
(12) **Patent Application Publication**  
**Gustafsson et al.**

(10) **Pub. No.: US 2010/0013717 A1**  
(43) **Pub. Date: Jan. 21, 2010**

(54) **ANTENNA INTEGRATED IN A PRINTED CIRCUIT BOARD**

**Publication Classification**

(76) Inventors: **Mattias Gustafsson**, Goteborg (SE); **Emil Wikgren**, Skelleftea (SE)

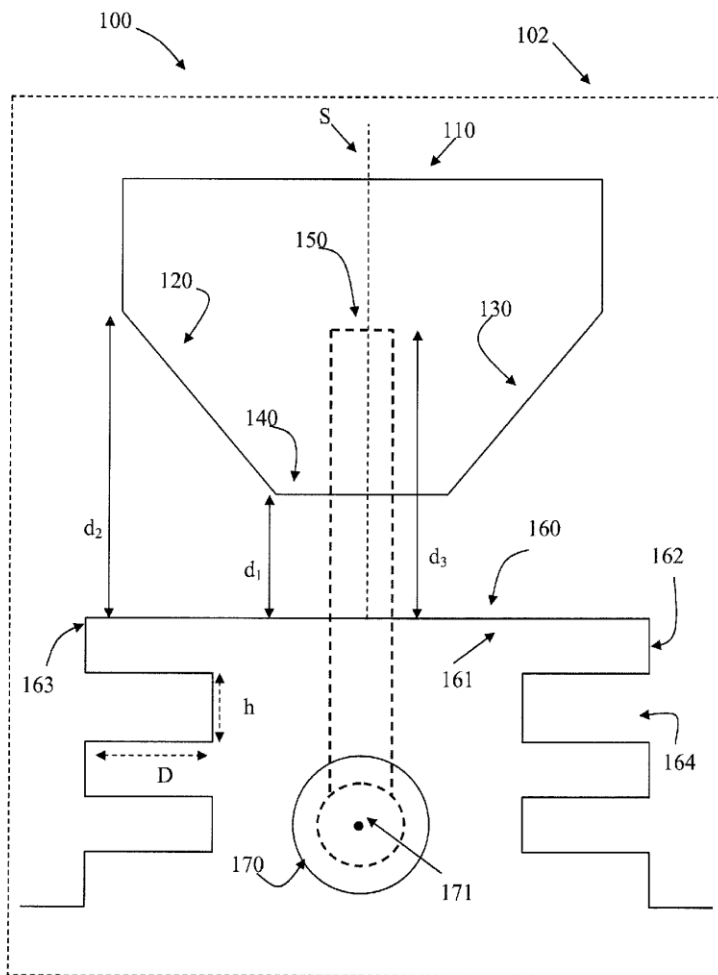
(51) **Int. Cl.**  
*H01Q 1/38* (2006.01)  
*H01Q 1/48* (2006.01)  
(52) **U.S. Cl.** ..... **343/700 MS; 343/848**

Correspondence Address:  
**ERICSSON INC.**  
**6300 LEGACY DRIVE, M/S EVR 1-C-11**  
**PLANO, TX 75024 (US)**

(57) **ABSTRACT**

An antenna for mounting in or on a non-conducting substrate, the antenna comprising a radiation element, a ground plane, coupling means for coupling the ground plane to the radiation element, and feeder means for connecting the antenna to other devices. The radiation element, the ground plane and the coupling means are separated from each other by the substrate, and the radiation element is so shaped and positioned with respect to the ground plane as to define a range of distances between a first edge of the ground plane and a first edge of the radiation element.

(21) Appl. No.: **12/520,761**  
(22) PCT Filed: **Dec. 22, 2006**  
(86) PCT No.: **PCT/SE06/50622**  
§ 371 (c)(1),  
(2), (4) Date: **Jun. 22, 2009**





US 20100013718A1

(19) **United States**

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

(10) **Pub. No.: US 2010/0013718 A1**

(43) **Pub. Date: Jan. 21, 2010**

(54) **MOBILE WIRELESS COMMUNICATIONS  
DEVICE WITH ANTENNA CONTACT  
HAVING REDUCED RF INDUCTANCE**

(22) Filed: **Jul. 15, 2008**

**Publication Classification**

(75) Inventors: **Lizhong ZHU**, Waterloo (CA);  
**George Mankaruse**, Kitchener  
(CA); **Michael Corrigan**, Waterloo  
(CA); **Perry Jarmuszewski**,  
Waterloo (CA); **Jun Jun Xu**,  
Waterloo (CA)

(51) **Int. Cl.**  
**H01Q 1/24** (2006.01)  
**H01Q 1/52** (2006.01)  
**H01Q 9/04** (2006.01)

(52) **U.S. Cl.** ..... **343/702; 343/841; 343/700 MS**

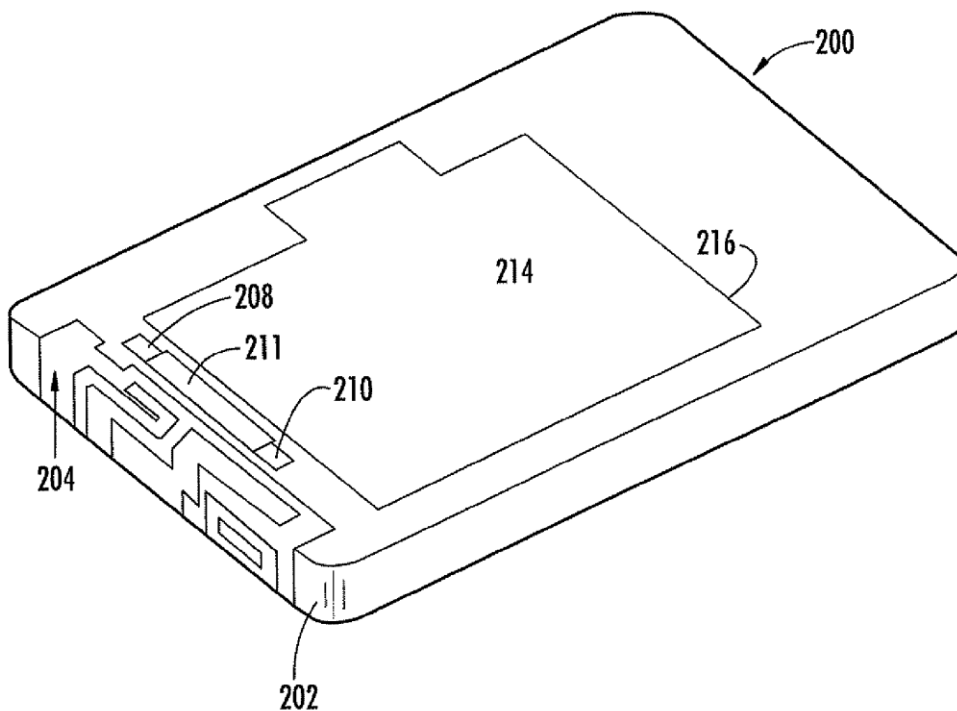
(57) **ABSTRACT**

Correspondence Address:  
**Allen, Dyer, Doppelt, Milbrath & Gilchrist - RIM**  
**255 S. Orange Avenue, Suite 1401**  
**Orlando, FL 32801 (US)**

A mobile wireless communications device includes a housing and at least one circuit board. Radio frequency (RF) circuitry is carried by the circuit board and includes a transceiver. A processor is carried by the at least one circuit board and operative with the RF circuitry. An antenna is mounted within the housing. An antenna contact is secured on the at least one circuit board and operatively connects the RF circuitry and engages the antenna at an antenna contact point. Electromagnetic interference (EMI) shielding is positioned at the antenna contact point and reduces RF inductance effects.

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

(21) Appl. No.: **12/173,043**





US 20100013721A1

(19) **United States**

(12) **Patent Application Publication**  
**Kojima**

(10) **Pub. No.: US 2010/0013721 A1**

(43) **Pub. Date: Jan. 21, 2010**

(54) **ANTENNA DEVICE AND PORTABLE RADIO APPARATUS USING THE SAME**

**Publication Classification**

(76) Inventor: **Takuya Kojima, Saitama (JP)**

(51) **Int. Cl.**  
*H01Q 5/00* (2006.01)  
*H01Q 1/24* (2006.01)  
*H01Q 9/04* (2006.01)

Correspondence Address:  
**Mr. Jackson Chen**  
**6535 N. STATE HWY 161**  
**IRVING, TX 75039 (US)**

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

(21) Appl. No.: **12/518,682**

(57) **ABSTRACT**

(22) PCT Filed: **Dec. 26, 2007**

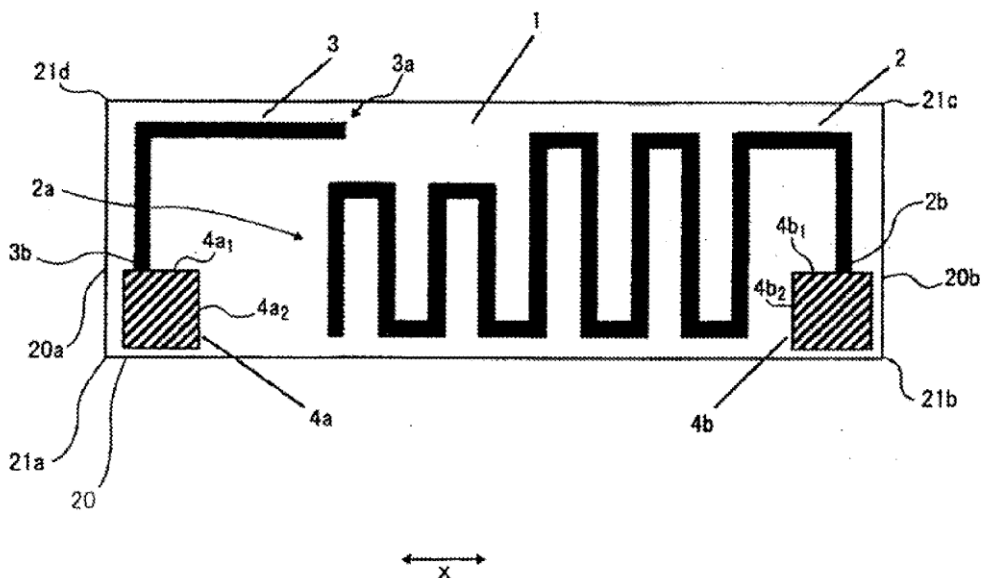
Disclosed is antenna device (1) comprising antenna board (20) including HI-Board antenna element (3), HI-Band feeding point (4a) electrically connected to HI-Band antenna element (3), LOW-Band antenna element (2), and LOW-Band feeding point (4b) electrically connected to LOW-Band antenna element (2). HI-Band feeding point (4a) is arranged on the side of first lateral portion (20a) of antenna board (20), and LOW-Band feeding point (4b) is arranged on the side of second lateral portion (20b) opposite to the side of first lateral portion (20a).

(86) PCT No.: **PCT/JP2007/074963**

§ 371 (c)(1),  
(2), (4) Date: **Jun. 11, 2009**

(30) **Foreign Application Priority Data**

Dec. 28, 2006 (JP) ..... 2006-353615





US 20100013732A1

(19) **United States**

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

(10) **Pub. No.: US 2010/0013732 A1**

(43) **Pub. Date: Jan. 21, 2010**

(54) **COMPACT MULTIBAND ANTENNA**

**Publication Classification**

(75) Inventors: **Ephraim Kapuliansky**, Nazerath Illit (IL); **Matti Martiskainen**, Tiberias Illit (IL); **Anatoly Berezin**, Tiberias (IL); **Steve Krupa**, Tiberias (IL)

(51) **Int. Cl.**  
**H01Q 7/00** (2006.01)  
**H01P 11/00** (2006.01)  
**H01Q 1/38** (2006.01)  
**H01Q 1/48** (2006.01)  
**H01Q 1/50** (2006.01)

Correspondence Address:  
**SUGHRUE MION, PLLC**  
2100 PENNSYLVANIA AVENUE, N.W., SUITE 800  
WASHINGTON, DC 20037 (US)

(52) **U.S. Cl.** ..... **343/866**; 29/600; 343/700 MS; 343/848; 343/741; 343/850

(73) Assignee: **GALTRONICS CORPORATION LTD.**, Tiberias (IL)

(57) **ABSTRACT**

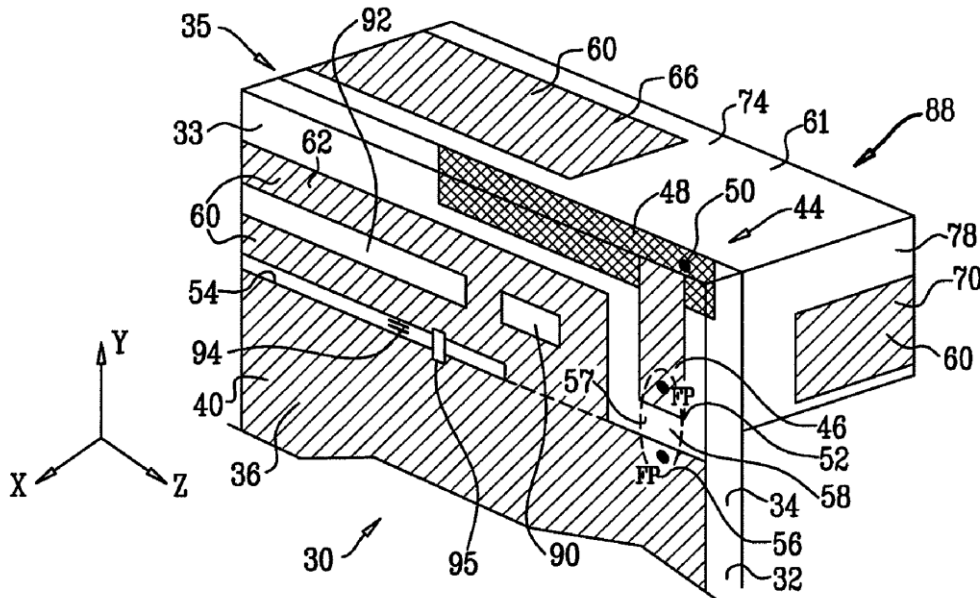
(21) Appl. No.: **12/466,156**

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

An antenna, including a dielectric carrier having a bounding surface, and a conductive monopole resonant at a first frequency, the monopole having at least one conducting section mounted on the bounding surface. The antenna further includes a labyrinthine conductive coupling element mounted on the bounding surface so as to encompass the dielectric carrier. The coupling element is located with respect to the conductive monopole so as to transfer from the conductive monopole a second frequency lower than the first frequency.

**Related U.S. Application Data**

(60) Provisional application No. 61/134,990, filed on Jul. 15, 2008.





US 20100016024A1

(19) **United States**

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

(10) **Pub. No.: US 2010/0016024 A1**

(43) **Pub. Date: Jan. 21, 2010**

(54) **MOBILE COMMUNICATIONS DEVICE**  
**DIVERSITY ANTENNA**

(22) Filed: **Jul. 21, 2008**

**Publication Classification**

(76) Inventors: **Guangli Yang**, Middle Island, NY (US); **Hongwei Liu**, South Elgin, IL (US); **Junsheng Zhao**, Vernon Hills, IL (US); **Adrian Napoles**, Lake Villa, IL (US)

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

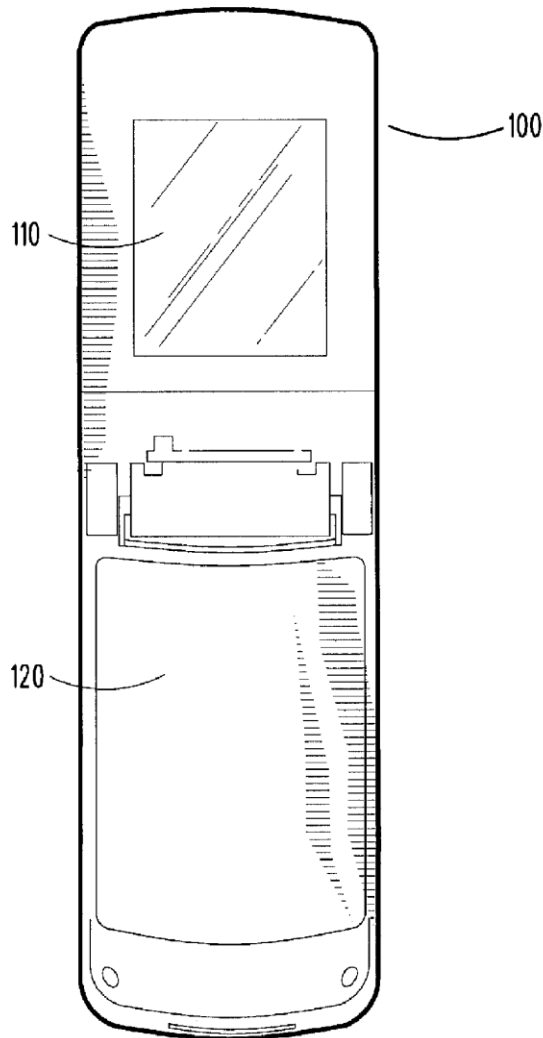
(52) **U.S. Cl.** ..... **455/566; 455/575.1**

(57) **ABSTRACT**

Correspondence Address:  
**MOTOROLA, INC.**  
**1303 EAST ALGONQUIN ROAD, IL01/3RD**  
**SCHAUMBURG, IL 60196**

A device including a battery, a wireless transceiver, and a battery cover. The battery cover is adapted to retain the battery in a desired position. The battery cover is further adapted to act as a first antenna in communication with the wireless transceiver for sending and receiving signals in a first frequency band.

(21) Appl. No.: **12/176,669**





US 20100019973A1

(19) **United States**

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

(10) **Pub. No.: US 2010/0019973 A1**

(43) **Pub. Date: Jan. 28, 2010**

(54) **MULTI-BAND ANTENNA**

**Publication Classification**

(75) Inventors: **Wen-Chieh YANG**, Tu-Cheng City (TW); **Yu-Yuan Wu**, Tu-Cheng City (TW); **Kai Shih**, Tu-Cheng City (TW); **Hsin-Tsung Wu**, Tu-Cheng City (TW)

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

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

(57) **ABSTRACT**

A multi-band antenna has a grounding plate, a radiating element and a parasitic element. The radiating element has a level radiating portion disposed a predetermined distance away from the grounding plate and a first connecting portion connecting the level radiating portion with the grounding plate. The parasitic element has a substantially L-shaped parasitic portion away from the grounding plate and a second connecting portion disposed at the same side of the grounding plate with the first connecting portion to connect a free end of the L-shaped parasitic portion with the grounding plate. The L-shaped parasitic portion is substantially at the same plane with and spatially fences the level radiating portion to define a substantially L-shaped space. The multi-band antenna has simple structure and small size to be assembled in the limited space of notebook.

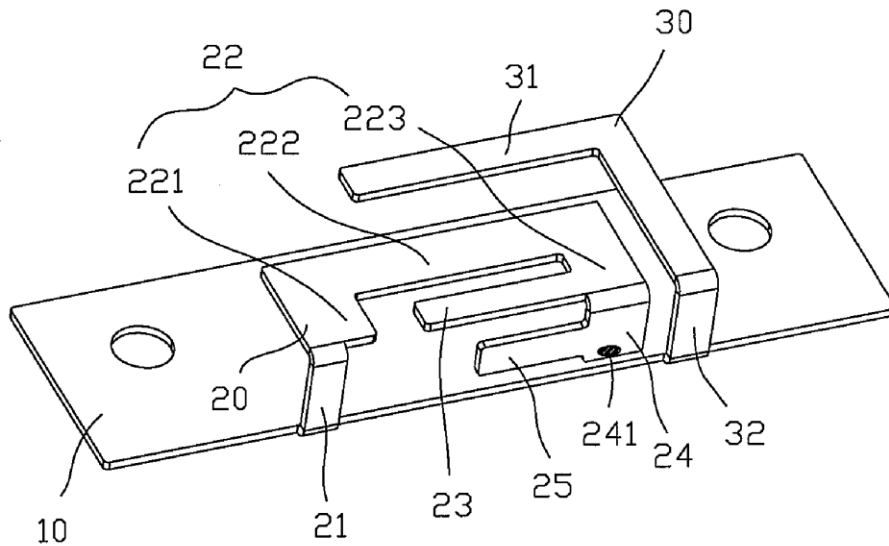
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(54) **MULTI-BAND ANTENNA**

**Publication Classification**

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**H01Q 1/38** (2006.01)

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

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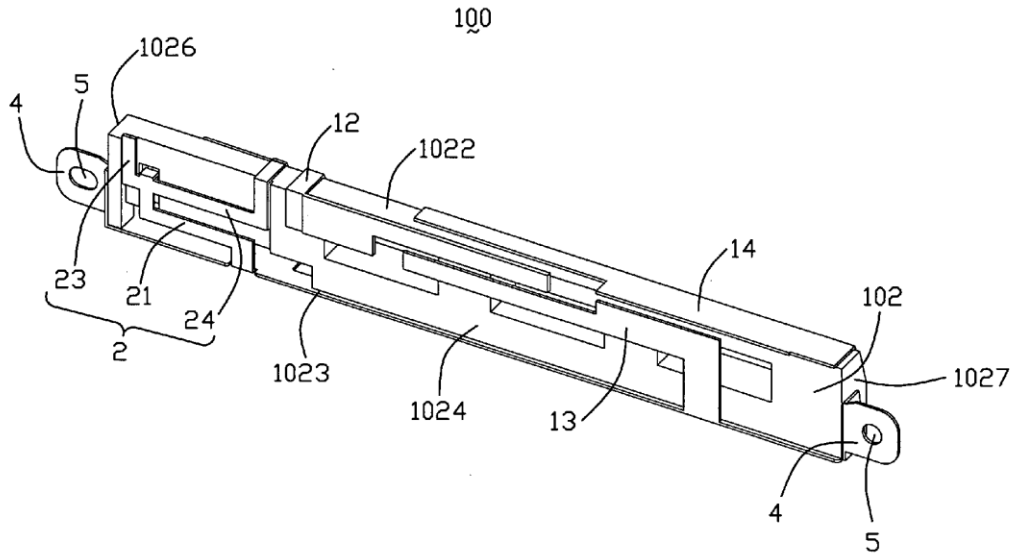
(57) **ABSTRACT**

A multi-band antenna includes an insulative supporting member, an antenna stripe comprising a ground element, a first antenna used for wireless wide area net and a second antenna used on wireless local area net, wherein said first antenna comprises a first radiating portion with a horizontal first feeding tab, said first radiating portion is separated from the grounding element, said antenna stripe surrounds the supporting member, said first radiating portion is fixed on the supporting member and covers plural faces of the supporting member.

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(21) Appl. No.: **12/220,524**

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(54) **ANTENNA DEVICE**

**Publication Classification**

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**H01Q 1/38** (2006.01)

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

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(57) **ABSTRACT**

In order to reduce waveform distortion caused by higher harmonic components of rectangular waveforms reduced as compared with fundamental frequency component when a wireless digital signal is directly and wirelessly transmitted and received by baseband transmission, an antenna apparatus includes a dielectric substrate including a ground conductor formed on a back surface thereof, and a radiation conductor formed on a front surface of the dielectric substrate. Upon directly transmitting and receiving a wireless digital signal via a feed point of the radiation conductor, formation of notched portions at sides of the radiation conductor, which intersect an electric field plane defined by an electric field when the antenna apparatus is excited, leads to reduction in the waveform distortion of waveform of the transmitted wireless digital signal.

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