



US 20110214923A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0214923 A1**

(43) **Pub. Date: Sep. 8, 2011**

(54) **LIGHT WEIGHT AND FULL PLANAR
ELECTROMAGNETIC DIGITIZER**

Publication Classification

(75) Inventors: **Wei-Chou Chen**, Hsin-Chu (TW);
Kuang-Yao Hsieh, Hsin-Chu
(TW); **Jen-Shuo Liu**, Hsin-Chu
(TW); **Chia-Te Huang**, Hsin-Chu
(TW)

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

(52) **U.S. Cl.** **178/18.01**

(73) Assignee: **WALTOP INTERNATIONAL
CORPORATION**, Hsin-Chu (TW)

(57) **ABSTRACT**

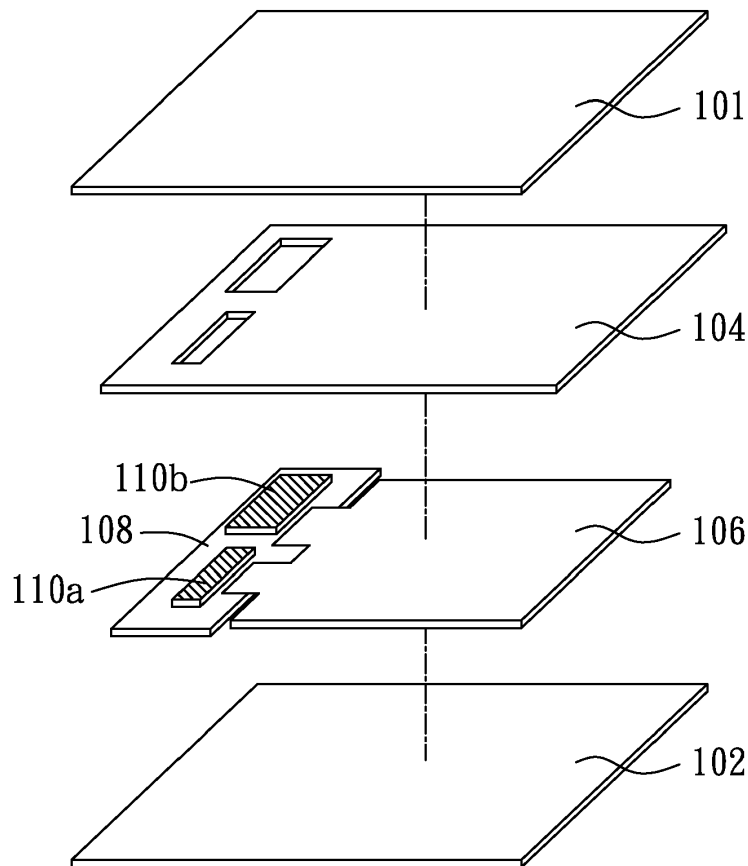
(21) Appl. No.: **12/903,929**

A light weight and full planar electromagnetic digitizer is disclosed. The electromagnetic digitizer comprises an upper board, a lower board, a circuit board and an antenna board and a cushion board. The circuit board has at least one electronic device to control the antenna board to transmit or receive electromagnetic signals and process received electromagnetic signals. The cushion board has at least one hole or cave to accommodate the electronic device. The circuit board, the antenna board and the cushion board are stacked between the upper board and the lower board.

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

(30) **Foreign Application Priority Data**

Mar. 5, 2010 (TW) 099106385



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US 20110215971A1

(19) **United States**

(12) **Patent Application Publication**
RAO

(10) **Pub. No.: US 2011/0215971 A1**

(43) **Pub. Date: Sep. 8, 2011**

(54) **LOW FREQUENCY DIVERSITY ANTENNA SYSTEM**

Publication Classification

(75) Inventor: **QINJIANG RAO, WATERLOO (CA)**

(51) **Int. Cl.**
H01Q 9/04 (2006.01)
H01Q 1/24 (2006.01)
H01Q 21/00 (2006.01)

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

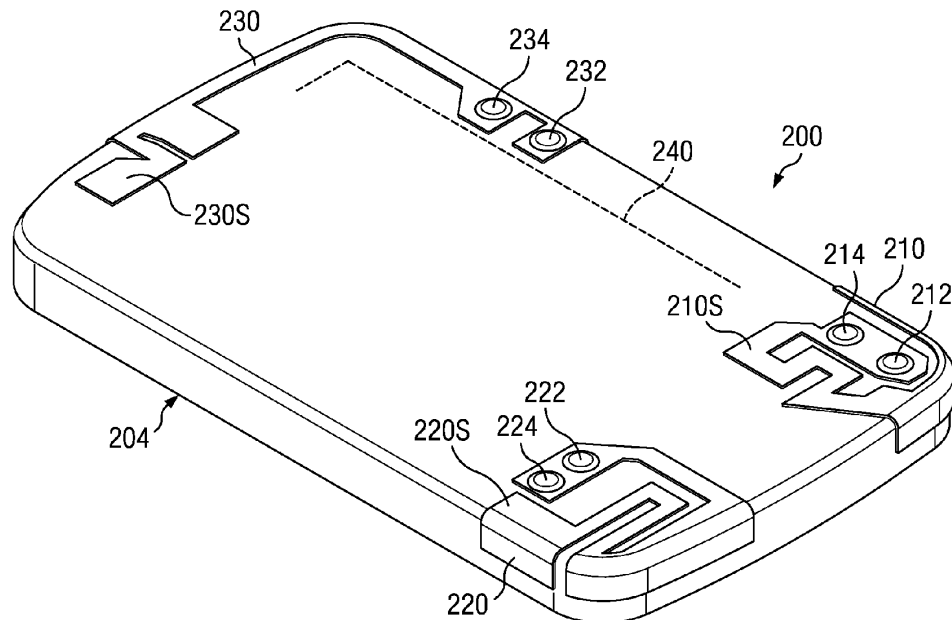
(52) **U.S. Cl.** **343/702; 343/893; 343/700 MS**

(21) Appl. No.: **12/718,862**

(57) **ABSTRACT**

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

A diversity antenna system that operates within a low frequency band ranging from 700 Megahertz is disclosed. A plurality of antennas are folded onto a single printed circuit in a meander pattern configuration. Each antenna has an independent feed port and ground pin. The plurality of antennas are configured within a compact mobile phone space to produce a high isolation and low correlation at resonating frequencies within the 700 Megahertz frequency band.



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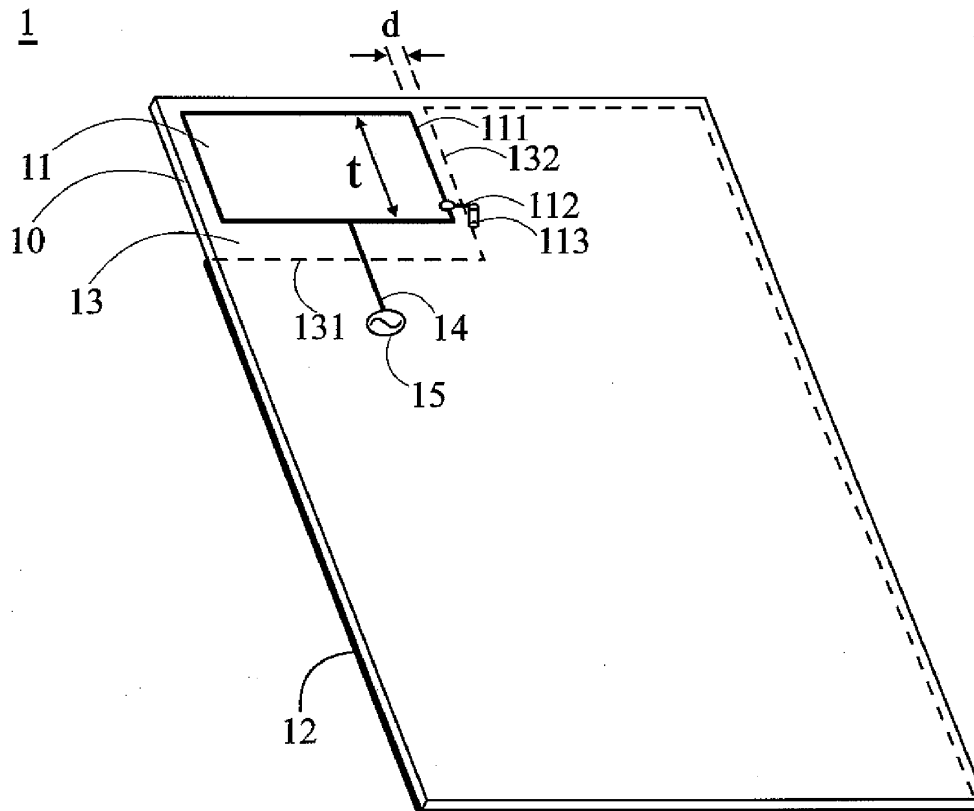
US 20110215972A1

(19) **United States**(12) **Patent Application Publication**
Wong et al.(10) **Pub. No.: US 2011/0215972 A1**(43) **Pub. Date: Sep. 8, 2011**(54) **SLIM MOBILE COMMUNICATION DEVICE
AND ANTENNA STRUCTURE THEREOF**(52) **U.S. CL.** 343/702; 343/700 MS(76) Inventors: **Kin-Lu Wong**, Hsichih (TW);
Wei-Yu Chen, Hsichih (TW)(57) **ABSTRACT**(21) Appl. No.: **12/789,903**

A slim mobile communication device includes an antenna structure. The antenna structure includes a dielectric substrate, a ground element, an antenna element, and a feeding line. The antenna element is a planar structure and is disposed on a no-ground portion of the dielectric substrate. At least two edges of the no-ground portion are surrounded by a ground element of the dielectric substrate, wherein one of the edges used as a feeding edge and the other edges are non-feeding edges. A distance between the non-feeding side edge of the antenna element and the second edge of the no-ground portion is smaller than 3 mm. A length of the non-feeding side edge of the antenna element is at least 5 mm. The non-feeding side edge of the antenna element is short-circuited to the ground element. The feeding line is coupled to the feeding side edge of the antenna element.

(22) Filed: **May 28, 2010**(30) **Foreign Application Priority Data**

Mar. 5, 2010 (TW) 099106538

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

Acrobat Document



US 20110215973A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0215973 A1**

(43) **Pub. Date: Sep. 8, 2011**

(54) **MULTIBAND ANTENNA AND PORTABLE
ELECTRONIC DEVICE USING THE SAME**

Publication Classification

(75) Inventors: **HSING-YUAN HSIEH**, Shindian
(TW); **JIA-MING DENG**,
Shenzhen (CN)

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

(73) Assignees: **SHENZHEN FUTAIHONG
PRECISION INDUSTRY CO.,
LTD.**, ShenZhen City (CN); **FIH
(HONG KONG) LIMITED**,
Kowloon (HK)

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

(21) Appl. No.: **12/821,266**

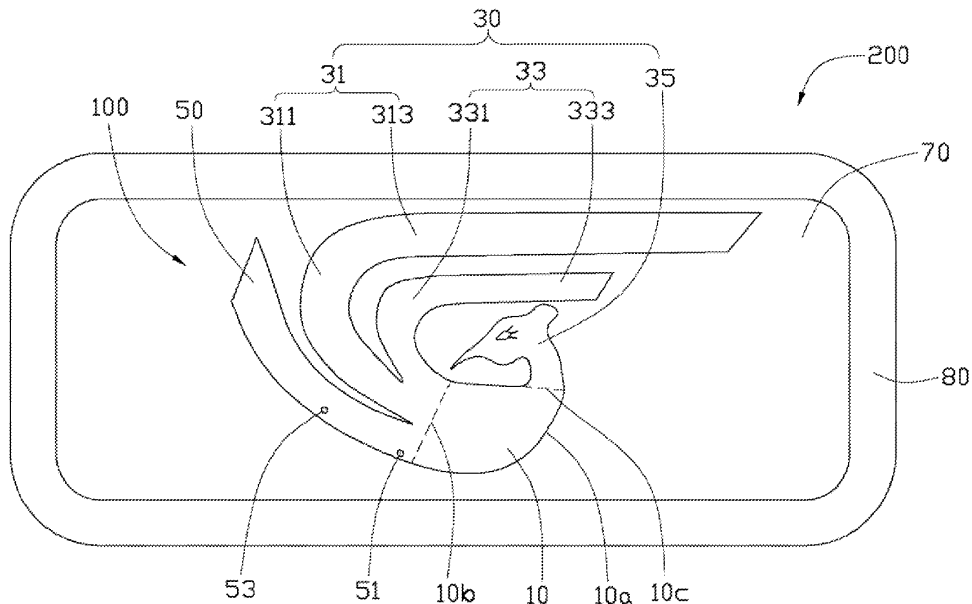
(22) Filed: **Jun. 23, 2010**

(30) **Foreign Application Priority Data**

Mar. 3, 2010 (CN) 201010116921.6

(57) ABSTRACT

A multiband antenna includes a first radiating unit, a second radiating unit connected to the first radiating unit and including a first radiating arm, a second radiating arm, and a third radiating arm, and a connecting unit connected to the first radiating unit. The first radiating unit, the second radiating unit, and the connecting unit are all planar sheets positioned coplanar with each other. The first radiating unit is a sector having a first radii side, a second radii side and an arc side. The first radiating arm, the second radiating arm, and the connecting unit are connected to the first radii side, and the third radiating arm is connected to the second radii side.



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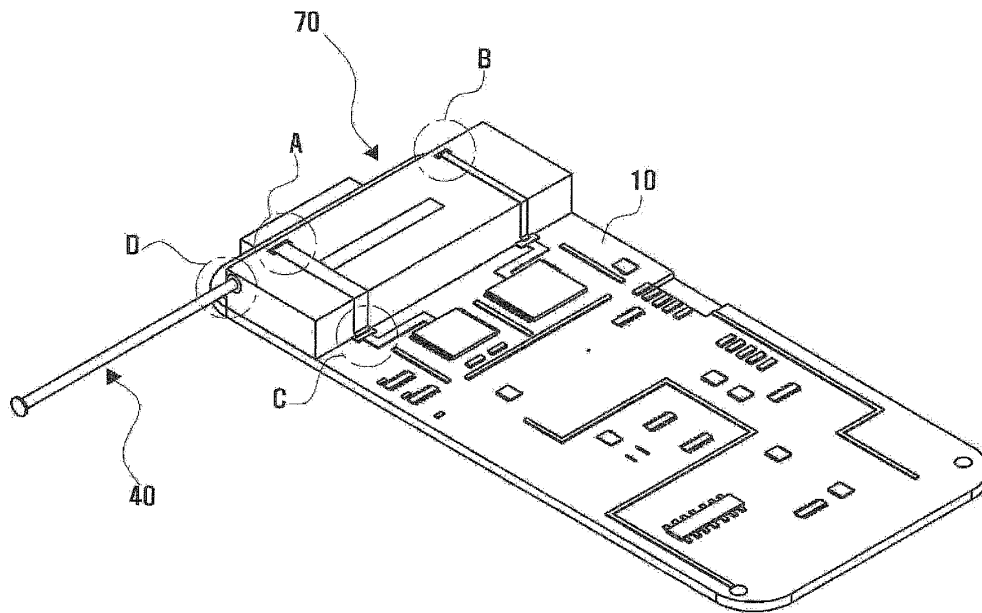
US 20110215974A1

(19) **United States**(12) **Patent Application Publication****Lee et al.**(10) **Pub. No.: US 2011/0215974 A1**(43) **Pub. Date: Sep. 8, 2011**(54) **MULTI-BAND ANTENNA APPARATUS OF PORTABLE TERMINAL****Publication Classification**(51) **Int. Cl.**
H01Q 21/30 (2006.01)
H01Q 1/24 (2006.01)(52) **U.S. Cl.** **343/702; 343/725**(57) **ABSTRACT**

A multi-band antenna apparatus of a portable terminal increases multi-band support and space utility by installing a broadcasting antenna in an installation space of a mobile communication antenna. The multi-band antenna apparatus includes a carrier engaging with a main circuit board of the portable terminal. A first antenna emitter is provided at one side of the carrier. A whip antenna including an outer sleeve is provided inside the carrier. A second antenna emitter electrically connected to an extension line is integrally extended from a first antenna emitter and an outer sleeve of a whip antenna. A first power supply line electrically connecting a first power supply pad is provided at the main circuit board to the first antenna emitter. And a second power supply line electrically connecting the outer sleeve of the whip antenna to a second power supply pad is provided at the main circuit board.

(75) Inventors: **Jong In Lee**, Hwaseong-si (KR);
Jang Hwan Noh, Nam-gu (KR)(73) Assignee: **SAMSUNG ELECTRONICS CO., LTD.**, Suwon-si (KR)(21) Appl. No.: **13/040,773**(22) Filed: **Mar. 4, 2011**(30) **Foreign Application Priority Data**

Mar. 5, 2010 (KR) 10-2010-0019646



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US 20110215980A1

(19) **United States**

(12) **Patent Application Publication**
LAI

(10) **Pub. No.: US 2011/0215980 A1**

(43) **Pub. Date: Sep. 8, 2011**

(54) **ANTENNA FOR PORTABLE DEVICE**

Publication Classification

(75) Inventor: **CHIH-HUNG LAI**, Tu-Cheng (TW)

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

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

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

(21) Appl. No.: **12/844,031**

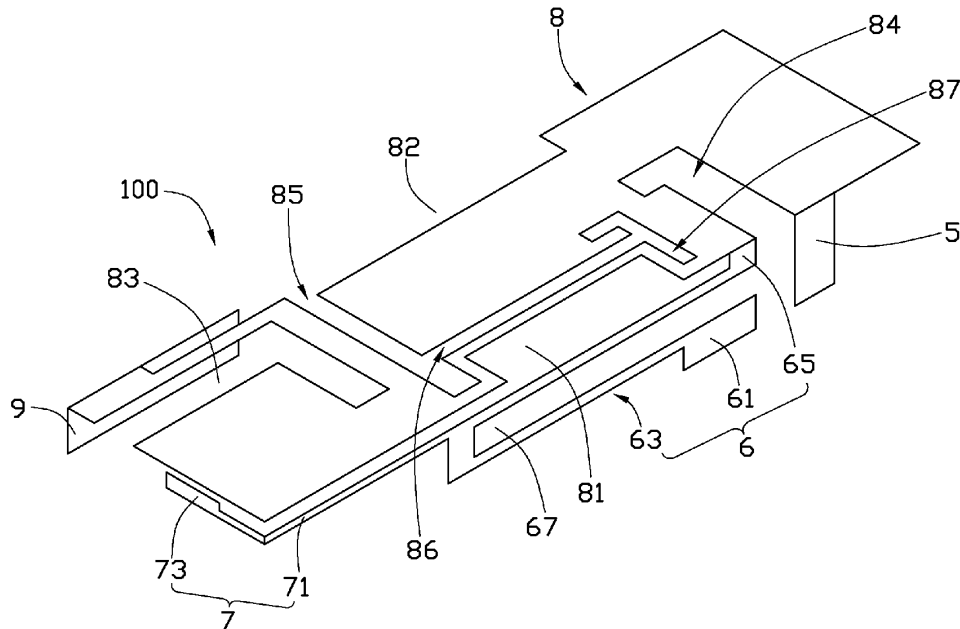
(22) Filed: **Jul. 27, 2010**

(57) **ABSTRACT**

The disclosure provides an antenna used for a portable device. The antenna includes a feed part, a ground part, a bent part, a main body, and an extended part. The main body connects with the feed part and the ground part. The main body further includes several gaps and slots so that the main body is divided into several radiating areas by the gaps and slots. The bent part is extended from the ground part. The extended part perpendicularly connects with the main body.

(30) **Foreign Application Priority Data**

Mar. 2, 2010 (TW) 99105997



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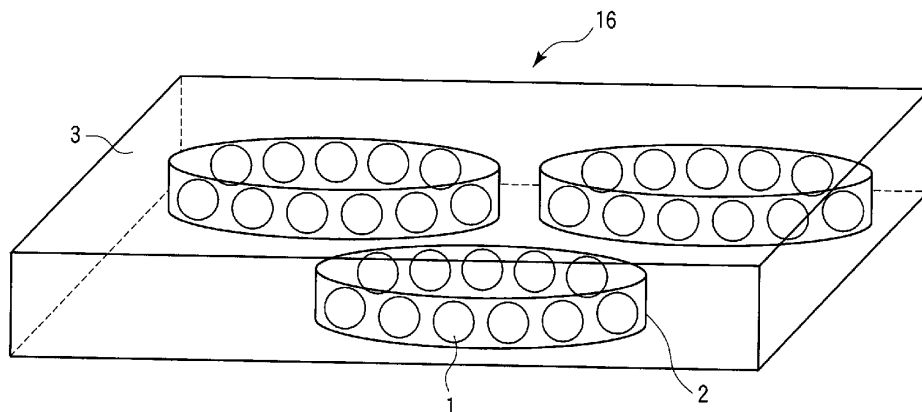
US 20110217543A1

(19) **United States**(12) **Patent Application Publication**
SUETSUNA et al.(10) **Pub. No.: US 2011/0217543 A1**(43) **Pub. Date: Sep. 8, 2011**(54) **NANOPARTICLE COMPOSITE MATERIAL
AND ANTENNA DEVICE AND
ELECTROMAGNETIC WAVE ABSORBER
USING THE SAME**(30) **Foreign Application Priority Data**

Mar. 5, 2010 (JP) 2010-049551

Publication Classification(51) **Int. Cl.**
B32B 5/16 (2006.01)(52) **U.S. Cl.** **428/323; 977/773**(57) **ABSTRACT**

According to one embodiment, there is provided a nanoparticle composite material, including nanoparticle aggregates in a shape having an average height of 20 nm or more and 2 μm or less and having an average aspect ratio of 5 or more, the nanoparticle aggregates including metal nanoparticles having an average diameter of 1 nm or more and 20 nm or less and containing at least one magnetic metals selected from the group consisting of Fe, Co and Ni and binder existing between the nanoparticle aggregates.

(76) **Inventors:** **Tomohiro SUETSUNA**,
Kawasaki-shi (JP); **Seiichi**
Suenaga, Yokohama-shi (JP);
Tomoko Eguchi, Tokyo (JP);
Koichi Harada, Tokyo (JP); **Maki**
Yonetsu, Mitaka-shi (JP); **Yasuyuki**
Hotta, Tokyo (JP); **Toshihide**
Takahashi, Yokohama-shi (JP)(21) **Appl. No.: 12/888,671**(22) **Filed: Sep. 23, 2010**

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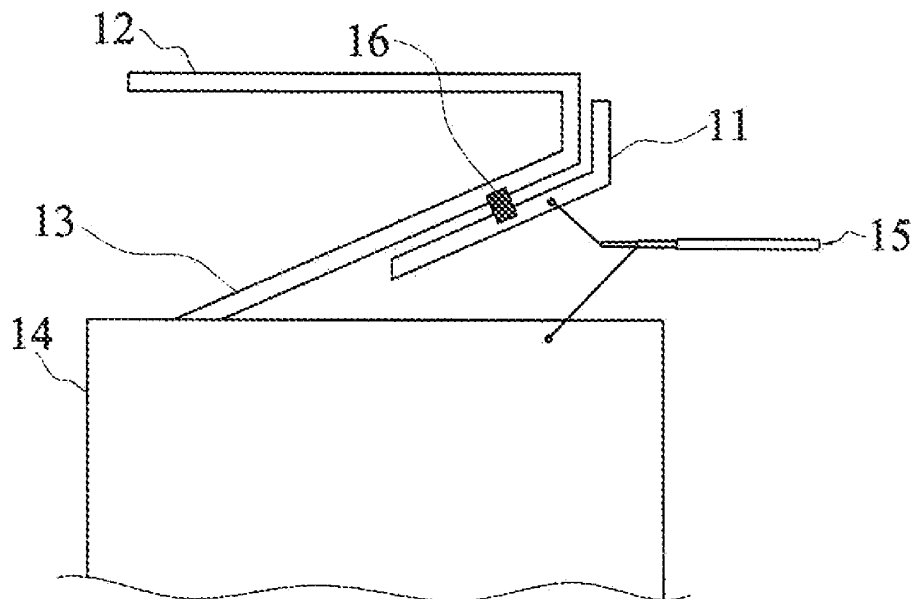
US 20110221636A1

(19) **United States**(12) **Patent Application Publication**
Chiu et al.(10) **Pub. No.: US 2011/0221636 A1**(43) **Pub. Date: Sep. 15, 2011**(54) **MULTIBAND ANTENNA**(52) **U.S. CL. 343/700 MS**(75) **Inventors:** **Tsung-Wen Chiu**, Taipei (TW); **Fu Ren Hsiao**, Taipei (TW); **Po-Yuan Liao**, Taipei (TW)(73) **Assignee:** **ADVANCED CONNECTEK, INC.**, Taipei County (TW)(21) **Appl. No.: 12/825,080**(22) **Filed: Jun. 28, 2010**(30) **Foreign Application Priority Data**

Mar. 12, 2010 (TW) 099107222

Publication Classification(51) **Int. Cl.**
H01Q 5/00 (2006.01)
H01Q 9/04 (2006.01)(57) **ABSTRACT**

A multiband antenna comprises a feeder member, a radiation conductor, a short-circuit member, a grounding plane and a feeder cable. The feeder member has a first coupling side. Two end of the short-circuit member are respectively connected with the radiation conductor and the grounding plane. The short-circuit member has a second coupling side parallel to and conformable to the first coupling side with a gap existing therebetween. The feeder cable has a central wire and an outer wire respectively connected with the feeder member and the grounding plane. The feeder member transmits a high-frequency fed-in signal to the short-circuit member in a capacitive coupling way. The multiband antenna of the present invention has a simplified antenna structure, a miniaturized size and wide frequency bands.



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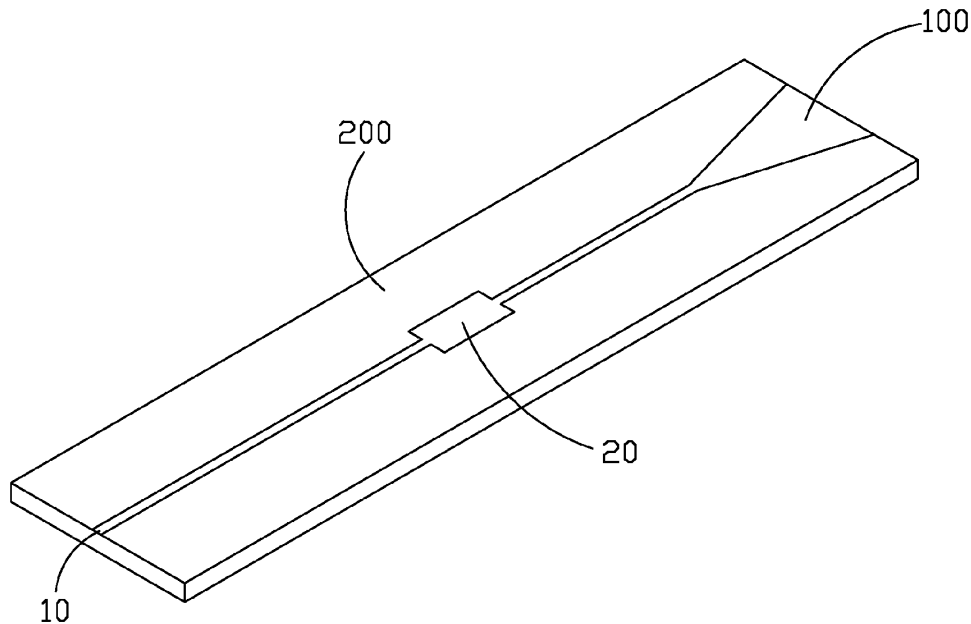
US 20110221637A1

(19) **United States**(12) **Patent Application Publication**
TU(10) **Pub. No.: US 2011/0221637 A1**(43) **Pub. Date: Sep. 15, 2011**(54) **MONOPOLE ANTENNA**(52) **U.S. CL. 343/700 MS**(75) **Inventor:** HSIN-LUNG TU, Tu-Cheng (TW)(73) **Assignee:** HON HAI PRECISION
INDUSTRY CO., LTD., Tu-Cheng
(TW)(21) **Appl. No.:** 12/848,214(22) **Filed:** Aug. 1, 2010(30) **Foreign Application Priority Data**

Mar. 12, 2010 (CN) 201020130009.1

Publication Classification(51) **Int. Cl.**
H01Q 1/38 (2006.01)(57) **ABSTRACT**

A monopole antenna is disposed on a substrate. The substrate includes a first surface and a second surface opposite to the first surface. The monopole antenna includes a feeding portion, a radiating portion, a grounding portion and a coupling portion. The feeding portion is disposed on the first surface to feed electromagnetic signals. The radiating portion is disposed on the first surface and with one end connected to the feeding portion. The grounding portion is positioned on the second surface substantially corresponding to the one end of the radiating portion. The coupling portion is positioned on the second surface and corresponding to the other end of the radiating portion. The radiating portion is coupled with the coupling portion to radiate electromagnetic signals.



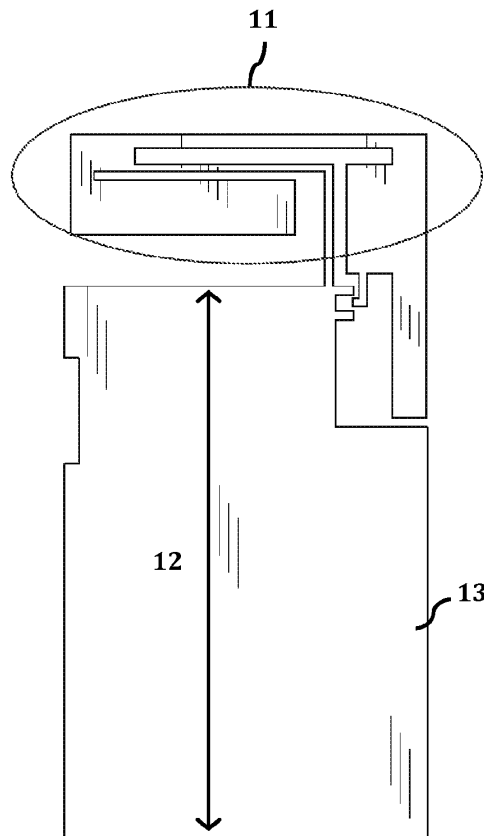
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US 20110221638A1

(19) **United States**(12) **Patent Application Publication**
Lin(10) **Pub. No.: US 2011/0221638 A1**(43) **Pub. Date: Sep. 15, 2011**(54) **INTERNAL LC ANTENNA FOR WIRELESS
COMMUNICATION DEVICE**(52) **U.S. CL. 343/700 MS**(75) Inventor: **Weichun Lin**, San Diego, CA (US)(73) Assignee: **ETHERTRONICS, INC.**, San
Diego, CA (US)(21) Appl. No.: **12/883,610**(22) Filed: **Sep. 16, 2010****Related U.S. Application Data**(63) Continuation of application No. 12/776,333, filed on
May 7, 2010, now abandoned.(60) Provisional application No. 61/176,438, filed on May
7, 2009.**Publication Classification**(51) **Int. Cl.**
H01Q 1/38 (2006.01)(57) **ABSTRACT**

An L-shape Corner (LC) Antenna uses an L shaped antenna on the corner of a circuit board of a wireless device. The low band element is positioned and designed to be resonate along the long edge of the adjacent ground plane while the high band element (H) is positioned and designed to be resonate along the short edge of the adjacent ground plane. The PCB (printed circuit board) of the wireless device that the antenna is integrated into can provide the ground plane function. The single antenna element provides two separate radiating sections that allow for optimization of low and high band resonances that are often required to service the cellular and other wireless frequency bands. The two radiating sections of the antenna provide different polarizations for the two resonances that assist in de-coupling the two resonances from each other. Both antenna elements can be an Isolated Magnetic Dipole (IMD) antenna; conversely, one of the two antenna elements can be an IMD element.



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US 20110221639A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0221639 A1**

(43) **Pub. Date: Sep. 15, 2011**

(54) **ANTENNA PATTERN FRAME, CASE OF ELECTRONIC DEVICE AND MOLD FOR MANUFACTURING THE SAME**

Publication Classification

(51) **Int. Cl.**
H01Q 9/04 (2006.01)
H01Q 1/38 (2006.01)
H01Q 1/24 (2006.01)
B29C 45/14 (2006.01)

(52) **U.S. Cl. 343/702; 343/700 MS; 425/116**

(57) **ABSTRACT**

There is provided an antenna pattern frame according to an exemplary embodiment of the present invention, including: a radiator that includes an antenna pattern part transmitting or receiving signals and a connection terminal part to transmit or receive the signals to and from a circuit substrate of an electronic device; and a radiator frame that supports the radiator, the radiator being manufactured by injection molding and the antenna pattern part being embedded in a case of the electronic device, wherein the radiator frame may be provided with a fastening part to be removed from the manufacturing mold for injection-molding the case of the electronic device in which the radiator is embedded.

(75) **Inventors:** **Dae Seong JEON**, Suwon (KR);
Hyun Kil NAM, Suwon (KR);
Hyun Do PARK, Yongin (KR);
Dae Kyu LEE, Suwon (KR); **Jae Suk SUNG**, Yongin (KR); **Sang Woo BAE**, Suwon (KR)

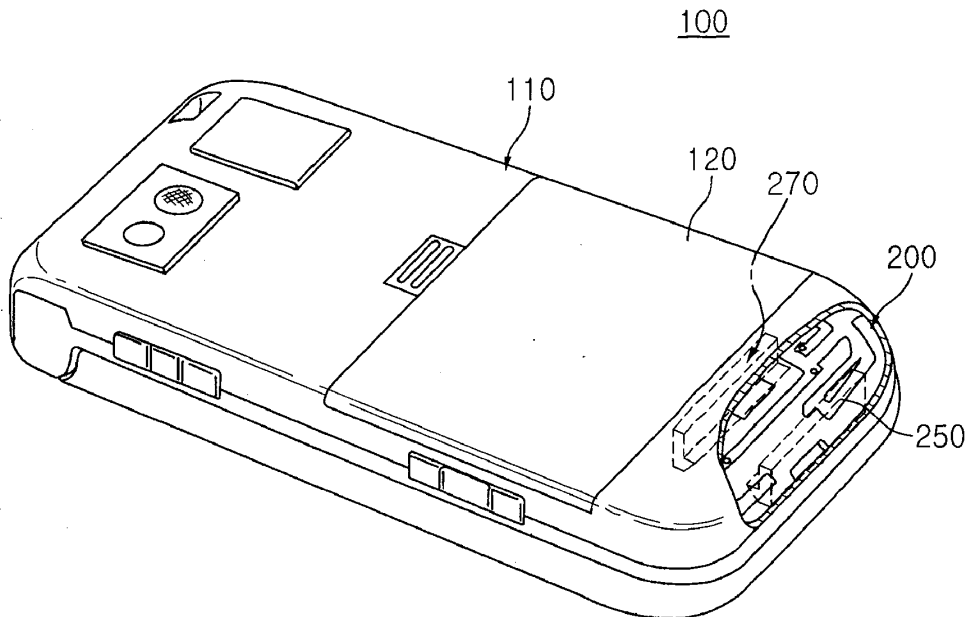
(73) **Assignee:** **SAMSUNG ELECTRO-MECHANICS CO., LTD.**, Suwon (KR)

(21) **Appl. No.: 13/030,374**

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

(30) **Foreign Application Priority Data**

Mar. 15, 2010 (KR) 10-2010-0022827



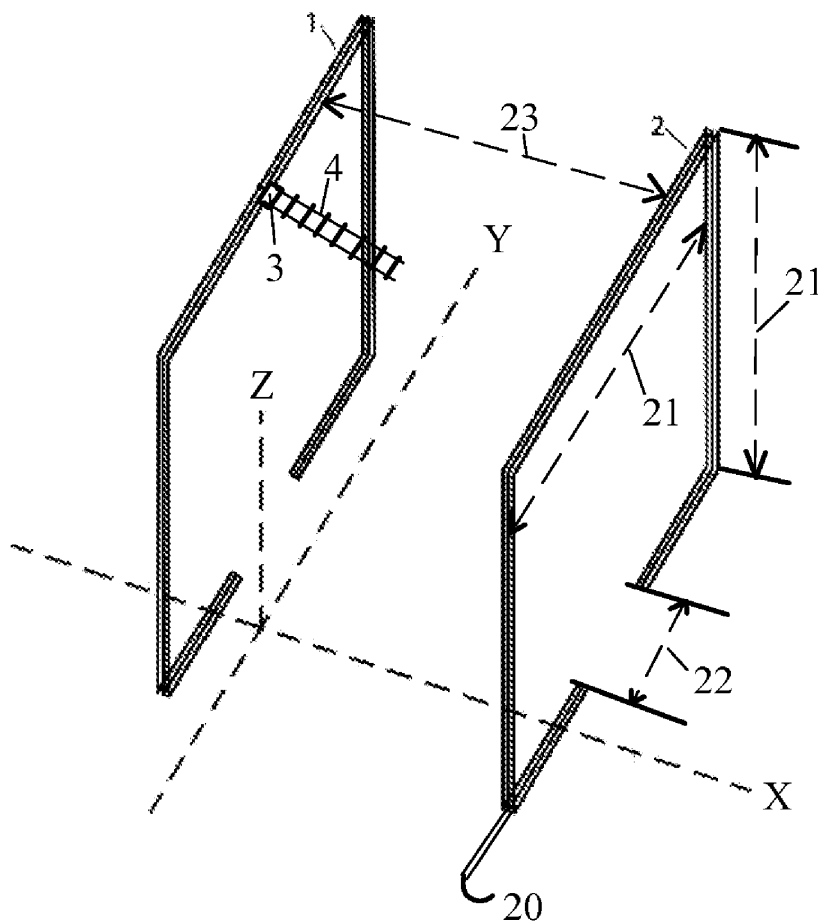
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US 20110221647A1

(19) **United States**(12) **Patent Application Publication**
Freiert(10) **Pub. No.: US 2011/0221647 A1**(43) **Pub. Date: Sep. 15, 2011**(54) **MULTI-ELEMENT FOLDED-DIPOLE
ANTENNA**(52) **U.S. CL. 343/803; 343/833**(76) **Inventor:** **Wayne A. Freiert**, Canandaigua,
NY (US)(21) **Appl. No.: 12/889,899**(22) **Filed: Sep. 24, 2010****Related U.S. Application Data**(60) Provisional application No. 61/313,401, filed on Mar.
12, 2010.**Publication Classification**(51) **Int. Cl.**
H01Q 19/06 (2006.01)
H01Q 9/26 (2006.01)(57) **ABSTRACT**

A multi-element directional antenna having three-wire elements in the form of square open loops. The three wires of each of the loops are arranged close together and aligned along the direction of radiation of the antenna. Each of the loops is open—that is, the wires are split, leaving a gap between the ends of the elements. In a two-element embodiment, an active driven element and a parasitic element are aligned and spaced apart along an axis of the direction of radiation of the antenna. One of the wires of the driven element is split in half, such that the driven element forms a three-wire folded dipole. Additional active or parasitic elements can be added.



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(19) **United States**(12) **Patent Application Publication**

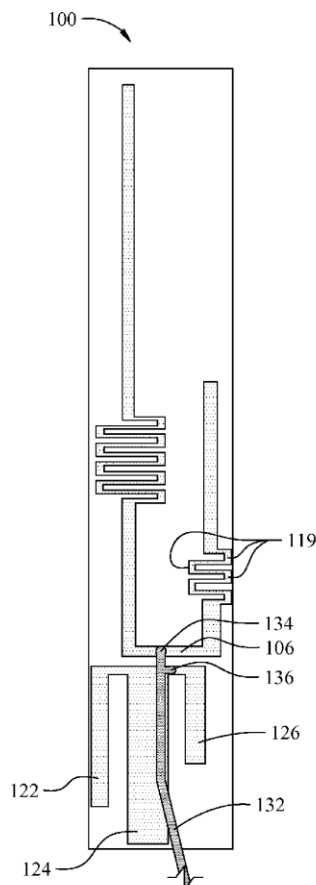
Lee et al.

(10) **Pub. No.: US 2011/0221648 A1**(43) **Pub. Date: Sep. 15, 2011**(54) **MULTIBAND HIGH GAIN
OMNIDIRECTIONAL ANTENNAS**(30) **Foreign Application Priority Data**

Jan. 2, 2009 (MY) PI20090004

(75) Inventors: **Ting Hee Lee**, Penang (MY);
Shanmuganathan Suganthan, San
Jose, CA (US)**Publication Classification**(51) **Int. Cl.**
H01Q 21/30 (2006.01)
H01Q 1/50 (2006.01)(73) Assignee: **LAIRD TECHNOLOGIES, INC.**,
Chesterfield, MO (US)(52) **U.S. Cl.** **343/826; 343/700 MS; 343/853**(21) Appl. No.: **13/113,756**(57) **ABSTRACT**(22) Filed: **May 23, 2011**

Exemplary embodiments are provided of multiband high gain omnidirectional antennas. In one exemplary embodiment, an antenna generally includes first and second radiating elements. The first radiating element is configured to produce a first radiation pattern at a first operating frequency. The second radiating element is configured to produce a second radiation pattern at a second operating frequency. Each of the first and second radiating elements includes a meandering or helical portion.

Related U.S. Application Data(63) Continuation-in-part of application No. PCT/US2009/
066786, filed on Dec. 4, 2009.

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US 20110222219A1

(19) **United States**(12) **Patent Application Publication****BAE et al.**(10) **Pub. No.: US 2011/0222219 A1**(43) **Pub. Date: Sep. 15, 2011**(54) **ELECTRONIC DEVICE CASE, MOLD FOR
MANUFACTURING THE SAME, AND
MOBILE COMMUNICATIONS TERMINAL**(30) **Foreign Application Priority Data**

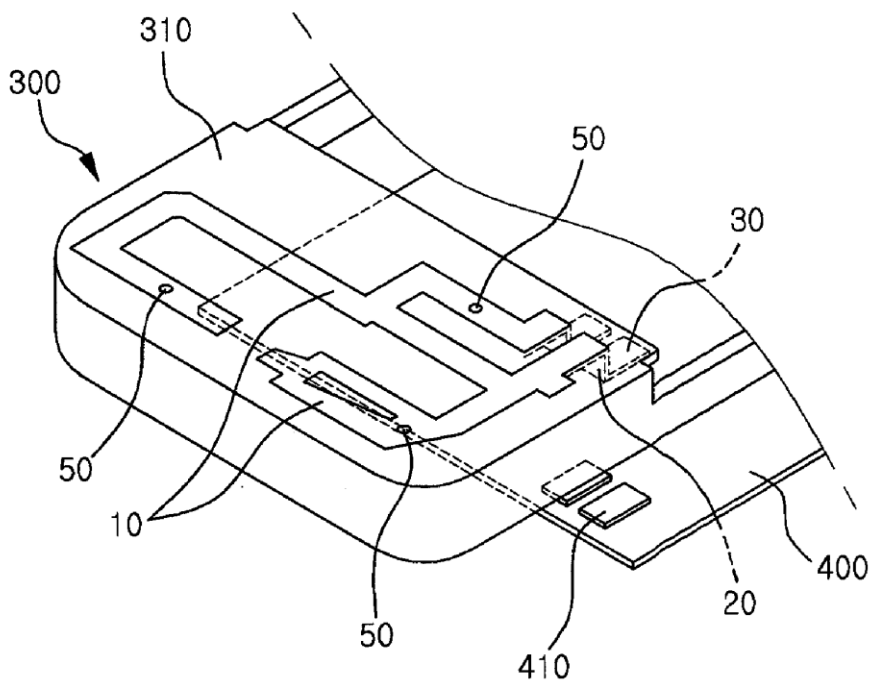
Mar. 15, 2010 (KR) 10-2010-0022826

Publication Classification(51) **Int. Cl.***B29C 45/14* (2006.01)*H05K 5/00* (2006.01)*B21C 3/00* (2006.01)(52) **U.S. Cl.** 361/679.01; 425/3; 425/116

(57)

ABSTRACT

Provided is an electronic device case. The electronic device case includes a radiator including an antenna pattern portion transmitting or receiving a signal, and a connection terminal portion transmitting the signal to or receiving the signal from a circuit board of an electronic device, and an electronic device case frame manufactured by subjecting the radiator to injection-molding, supporting the radiator and forming an exterior of the electronic device. The antenna pattern portion includes an exposed portion exposed on the outermost edge of the electronic device case frame.

(75) **Inventors:** **Sang Woo BAE**, Suwon (KR); **Sung Eun CHO**, Suwon (KR); **Dae Kyu LEE**, Suwon (KR); **Hyun Kil NAM**, Suwon (KR); **Chan Gwang AN**, Suwon (KR); **Jae Suk SUNG**, Yongin (KR); **Dae Seong JEON**, Suwon (KR); **Dae Ki LIM**, Seongnam (KR); **Chang Mok HAN**, Cheonan (KR); **Hyun Do PARK**, Yongin (KR)(73) **Assignee:** **SAMSUNG
ELECTRO-MECHANICS CO.,
LTD.**, Suwon (KR)(21) **Appl. No.: 13/038,776**(22) **Filed: Mar. 2, 2011**

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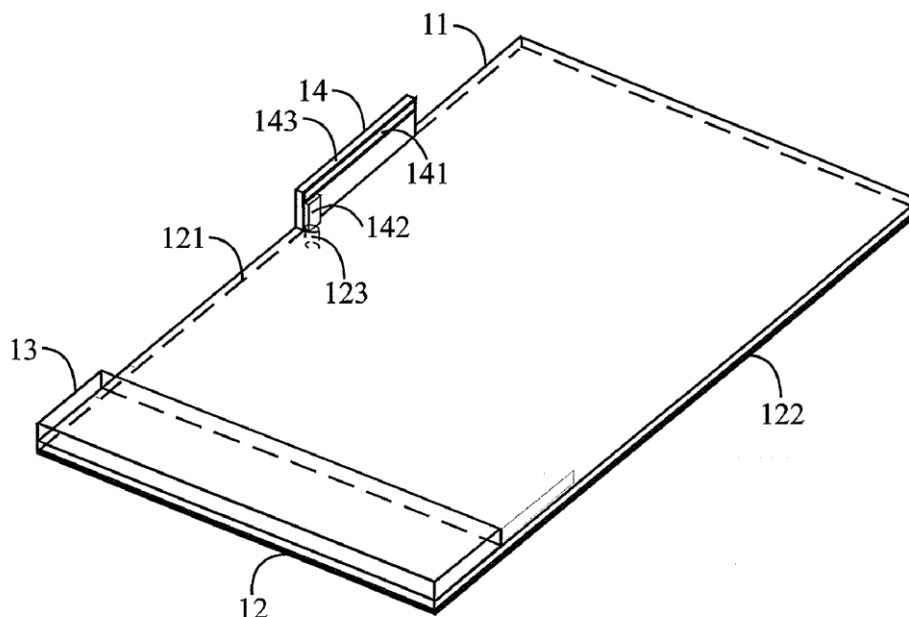
US 20110223858A1

(19) **United States**(12) **Patent Application Publication****Wong et al.**(10) **Pub. No.: US 2011/0223858 A1**(43) **Pub. Date: Sep. 15, 2011**(54) **MOBILE COMMUNICATION DEVICE WITH
LOW NEAR-FIELD RADIATION AND
RELATED ANTENNA STRUCTURE**(76) Inventors: **Kin-Lu Wong**, Hsichih (TW);
Chih-Hua Chang, Hsichih (TW)(21) Appl. No.: **12/797,757**(22) Filed: **Jun. 10, 2010**(30) **Foreign Application Priority Data**

Mar. 11, 2010 (TW) 099107160

Publication Classification(51) **Int. Cl.**
H04B 5/00 (2006.01)
H01Q 9/04 (2006.01)(52) **U.S. CL.** **455/41.1; 343/700 MS**(57) **ABSTRACT**

A mobile communication device includes an antenna structure. The antenna structure includes a circuit board; a ground plane disposed on the second surface of the circuit board and includes a first side edge and a second side edge; an antenna element disposed on the first surface of the circuit board or placed near the circuit board, and includes a first operating band and a second operating band; and a first inductively-coupled element, located near the first side edge of the ground plane, and includes a metal plate and an inductive element, wherein the metal plate is electrically connected to the ground plane through the inductive element. The first inductively-coupled element generates a resonant mode at a specific frequency within the second operating band to reduce a surface current excitation on the ground plane and reduce near-field E-field and H-field strengths of the mobile communication device within the second operating band.

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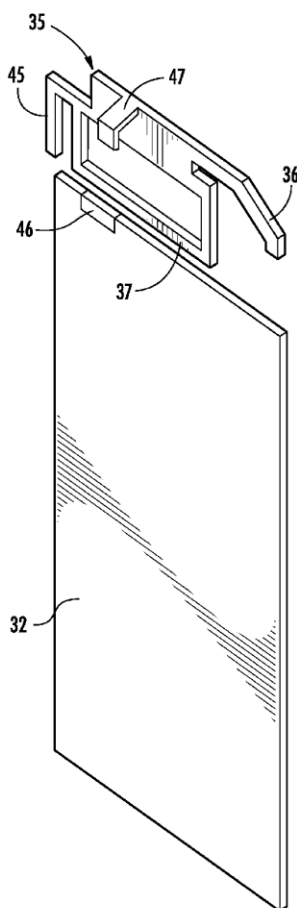
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US 20110223873A1

(19) **United States**(12) **Patent Application Publication**
Qiu(10) **Pub. No.: US 2011/0223873 A1**(43) **Pub. Date: Sep. 15, 2011**(54) **MOBILE WIRELESS DEVICE WITH
MULTI-BAND ANTENNA AND RELATED
METHODS****Publication Classification**(51) **Int. Cl.**
H04B 1/38 (2006.01)
H01Q 21/28 (2006.01)
H01P 11/00 (2006.01)(52) **U.S. Cl.** **455/90.2; 343/726; 29/600**(57) **ABSTRACT**(75) Inventor: **Meide Qiu, Ottawa (CA)**(73) Assignee: **Research In Motion Limited,**
Waterloo (CA)(21) Appl. No.: **12/945,200**(22) Filed: **Nov. 12, 2010****Related U.S. Application Data**(60) Provisional application No. 61/313,337, filed on Mar.
12, 2010.

A mobile wireless communications device may include a portable housing, and a printed circuit board (PCB) carried by the housing and having opposing upper and lower portions. The device may also include at least one wireless transceiver carried by the portable housing, and a satellite positioning signal receiver carried by the portable housing. An antenna assembly may be carried adjacent the upper portion of the PCB. The antenna assembly may include a horizontal conductor extending along the upper portion of the PCB in spaced relation therefrom. The horizontal conductor may be coupled to the satellite positioning receiver. The antenna assembly may also include a loop conductor extending from the horizontal conductor toward the lower portion of the PCB and in spaced relation from the PCB. The loop conductor may be coupled to the wireless transceiver.



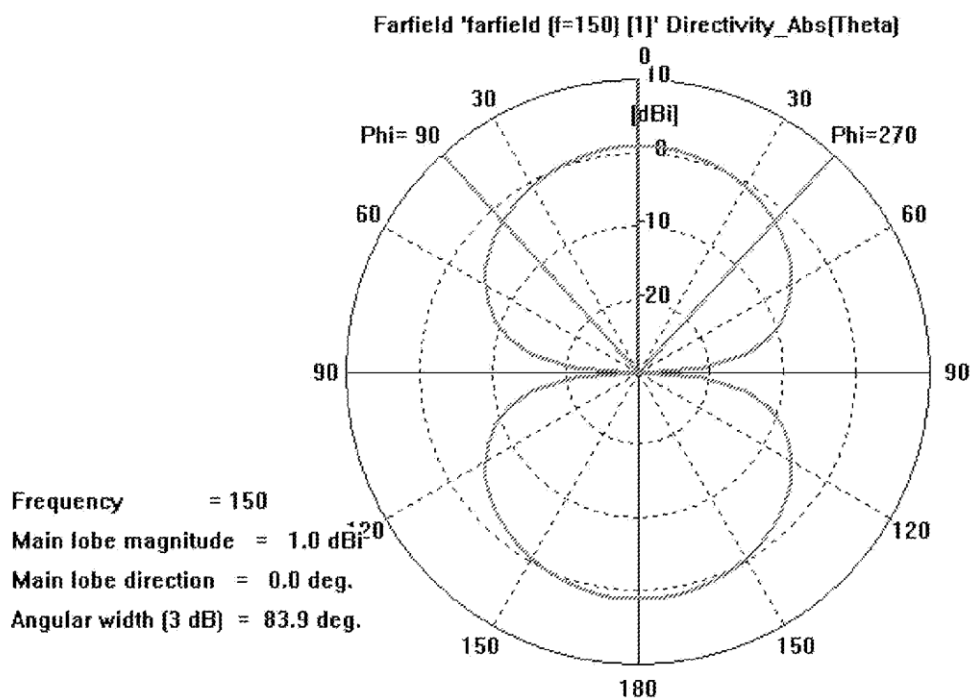
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US 20110227776A1

(19) **United States**(12) **Patent Application Publication**
WEBB(10) **Pub. No.: US 2011/0227776 A1**(43) **Pub. Date: Sep. 22, 2011**(54) **MULTI-FEED DIPOLE ANTENNA AND METHOD**(52) **U.S. CL.** 342/14; 343/818; 343/810; 343/793(57) **ABSTRACT**(76) **Inventor:** **Spencer L. WEBB**, Pelham, NH (US)(21) **Appl. No.:** **12/728,009**(22) **Filed:** **Mar. 19, 2010****Publication Classification**(51) **Int. Cl.**
H01Q 9/16 (2006.01)
H01Q 19/10 (2006.01)
H01Q 21/00 (2006.01)
G01S 7/38 (2006.01)

A multi-feed dipole antenna and method. Provides a volumetrically efficient antenna with wide radiation pattern bandwidth and wide impedance bandwidth that are relatively independent. Driving the antenna at multiple locations provides for a half wavelength dipole antenna with a wider frequency range than any other known fat dipole of similar volume. The apparatus is constructed from brass or any other suitable metal without requiring dielectric loading and without requiring direct coupling on the outside of the tubes. The apparatus utilizes a parasitic center tube with two end tubes that are driven by a collinearly mounted metal rod that is driven from the midpoint. Insulators hold the parasitic tube to the end tubes. The parasitic tube allows for induced currents to flow on the surface of the tube which allow for operation of the dipole over a wide frequency range.



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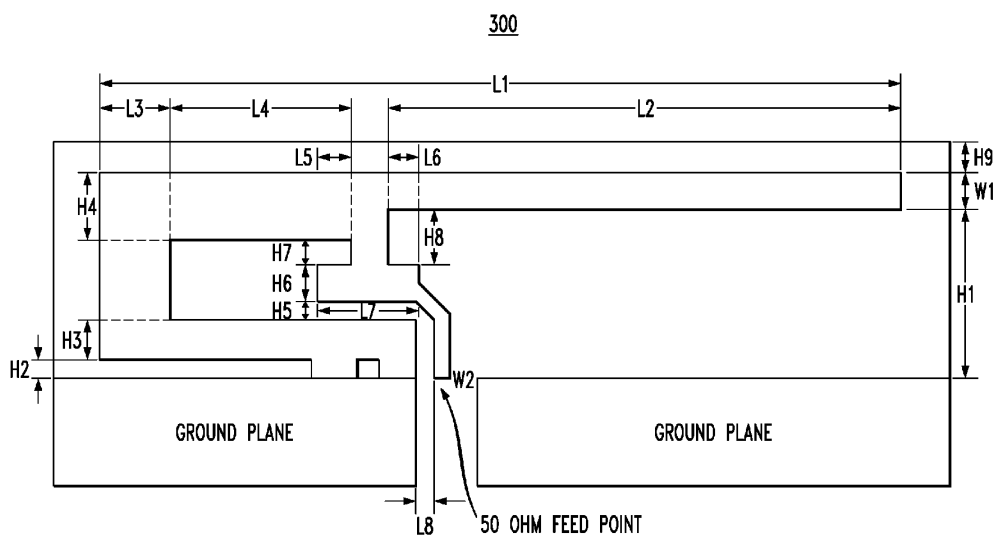
US 20110227794A1

(19) **United States**(12) **Patent Application Publication**
Fratti(10) **Pub. No.: US 2011/0227794 A1**(43) **Pub. Date: Sep. 22, 2011**(54) **PACKAGE INVERTED F-ANTENNA****Publication Classification**(75) Inventor: **Roger Fratti, Mohnton, PA (US)**(73) Assignee: **LSI Corporation**(21) Appl. No.: **12/727,377**(22) Filed: **Mar. 19, 2010**(51) **Int. Cl.****H01Q 1/38** (2006.01)**H01L 21/56** (2006.01)(52) **U.S. Cl. 343/700 MS; 438/124; 257/E21.502**

(57)

ABSTRACT

In described embodiments, a package inverted-F antenna is disclosed. The inverted-F antenna (IFA) is printed on a semiconductor package, and conductive bonding material is applied to leads of the IFA and terminal pads of a substrate when bonding the package to the substrate holding a semiconductor die. Wire leads couple the output terminals of the die to the terminal pads and, hence, the IFA.



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US 20110227795A1

(19) **United States**

(12) **Patent Application Publication**

Lopez et al.

(10) **Pub. No.: US 2011/0227795 A1**

(43) **Pub. Date: Sep. 22, 2011**

(54) **ANTENNA STRUCTURES**

(60) Provisional application No. 61/301,041, filed on Feb. 3, 2010.

(76) Inventors: **Norberto Lopez**, San Diego, CA (US); **Nan Xu**, San Diego, CA (US); **Ajay Gummalla**, Sunnyvale, CA (US); **Vaneet Pathak**, San Diego, CA (US); **Maha Achour**, Encinitas, CA (US)

Publication Classification

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

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

(21) Appl. No.: **13/018,731**

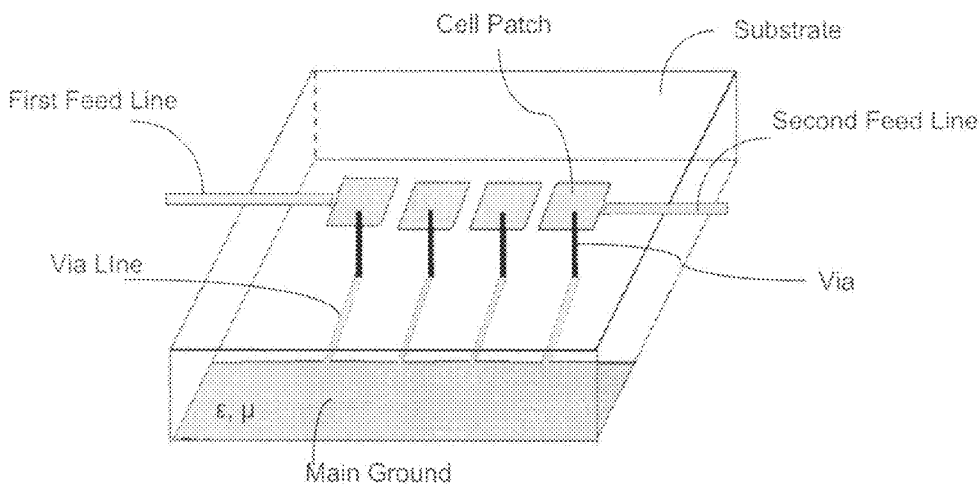
(22) Filed: **Feb. 1, 2011**

Related U.S. Application Data

(63) Continuation-in-part of application No. 12/465,571, filed on May 13, 2009.

(57) **ABSTRACT**

Antenna structures and configurations which incorporate alignment keys and support structures which mate Composite Right and Left Handed (CRLH) metamaterial (MTM) structures formed on two or more substrates.



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US 20110227798A1

(19) **United States**

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

(10) **Pub. No.: US 2011/0227798 A1**

(43) **Pub. Date: Sep. 22, 2011**

(54) **WIRELESS COMMUNICATION DEVICE**

(30) **Foreign Application Priority Data**

(75) Inventors: **CHO-KANG HSU**, Tu-Cheng
(TW); **YI-TING CHEN**, Tu-Cheng
(TW)

Mar. 16, 2010 (TW) 99107551

Publication Classification

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

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

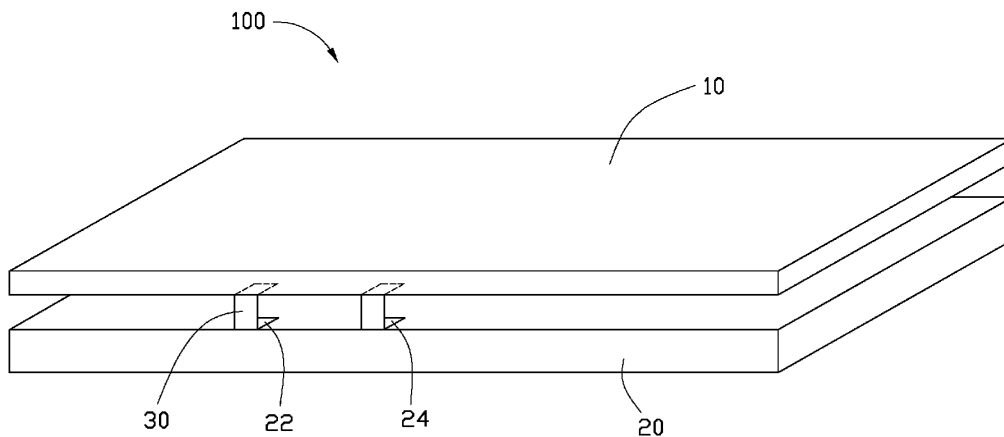
(52) **U.S. Cl.** **343/702**

(57) **ABSTRACT**

(21) Appl. No.: **12/771,319**

A wireless communication device includes a housing and a circuit board. The circuit board includes a signal transmitting point and a grounding point. The housing connects to the signal transmitting point and the grounding point, and forms an antenna with the signal transmitting point and the grounding point.

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



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US 20110227799A1

(19) **United States**(12) **Patent Application Publication**
HASHIMOTO(10) **Pub. No.: US 2011/0227799 A1**(43) **Pub. Date: Sep. 22, 2011**(54) **ANTENNA AND PORTABLE TERMINAL**
USING THE SAME(52) **U.S. CL.** **343/702; 343/866**(75) **Inventor:** **Yoshinori HASHIMOTO,**
Miyazaki (JP)(57) **ABSTRACT**(73) **Assignee:** **PANASONIC CORPORATION,**
Osaka (JP)

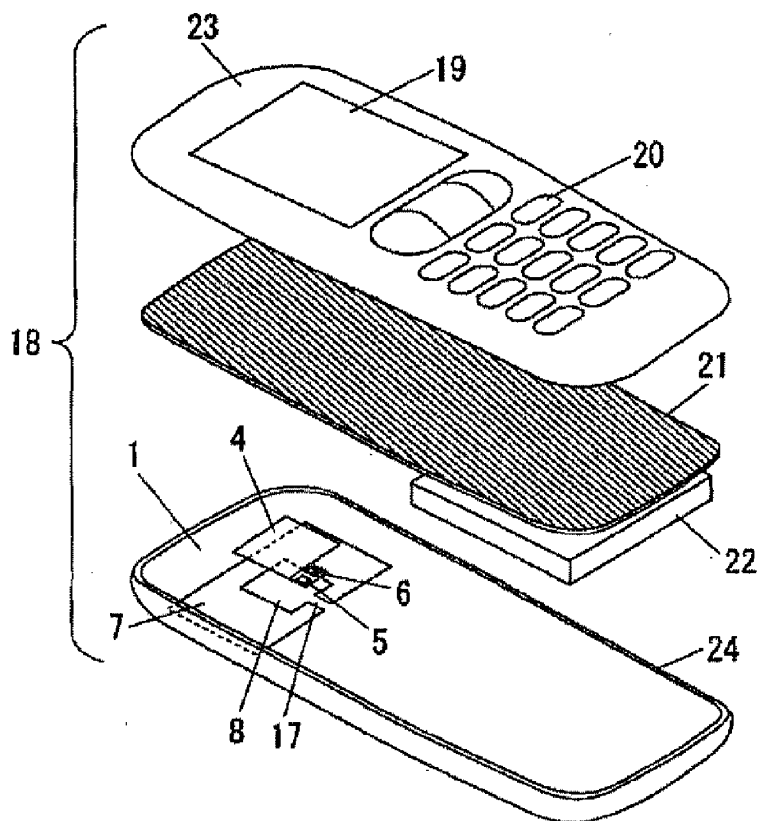
The present invention aims at providing an antenna that exhibits superior communication performance within a communicable area because an air field within the communicable area is reduced while the communicable area is being expanded, and also providing a portable terminal using the same.

(21) **Appl. No.:** **13/038,075**(22) **Filed:** **Mar. 1, 2011**

In order to accomplish the objective, the antenna of the present invention includes the followings; namely, a loop antenna having an aperture; a metallic body that opposes the loop antenna and that is electrically insulated from the loop antenna; and a notch that is provided in the metallic body and that is coupled with a periphery of the metallic body, wherein at least a portion of the loop antenna opposes the metallic body, and at least a portion of the notch is covered with the aperture.

(30) **Foreign Application Priority Data**

Mar. 17, 2010 (JP) P2010-060617

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

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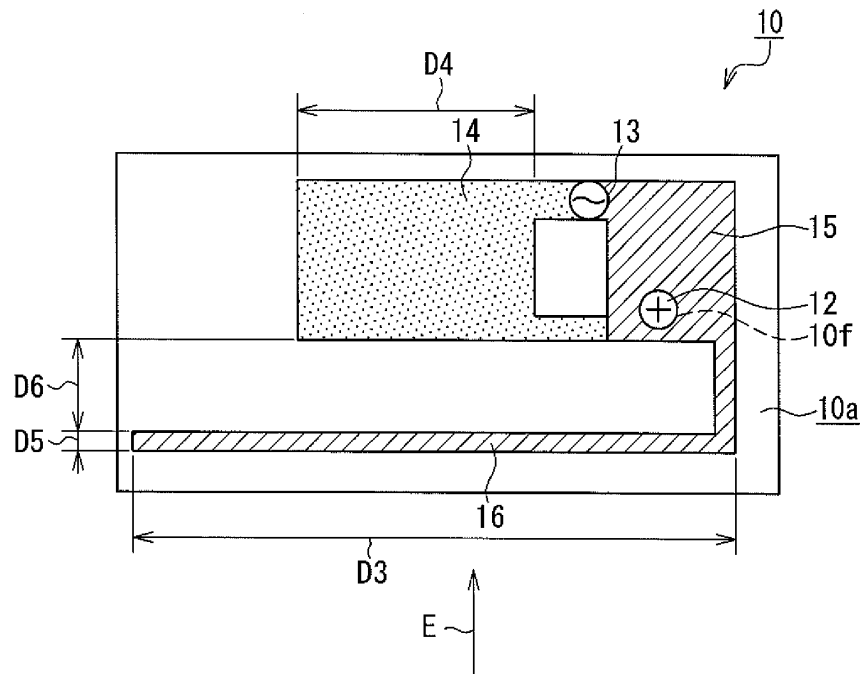


US 20110227803A1

(19) **United States**(12) **Patent Application Publication**
NAKANO et al.(10) **Pub. No.: US 2011/0227803 A1**(43) **Pub. Date: Sep. 22, 2011**(54) **ANTENNA UNIT, AND ELECTRONIC
APPARATUS INCLUDING THE SAME****Publication Classification**(75) Inventors: **Kazuya NAKANO**, Kanagawa
(JP); **Kenji NISHIKAWA**, Hyogo
(JP); **Kazuya TANI**, Osaka (JP)(51) **Int. Cl.**
H01Q 19/10 (2006.01)(52) **U.S. Cl.** **343/834**(73) Assignee: **PANASONIC CORPORATION**,
Osaka (JP)(57) **ABSTRACT**(21) Appl. No.: **13/039,462**(22) Filed: **Mar. 3, 2011**(30) **Foreign Application Priority Data**

Mar. 18, 2010 (JP) 2010-062753

A GPS antenna is provided with a reflective conductor portion. Thereby, an electromagnetic wave radiated from an antenna conductor portion in a predetermined direction can be grounded electrically, and thus radiation of the electromagnetic wave in a direction (arbitrary direction) opposite to the predetermined direction can be enhanced. As a result, the directivity of the electromagnetic wave in the arbitrary direction can be enhanced to improve the positioning accuracy.



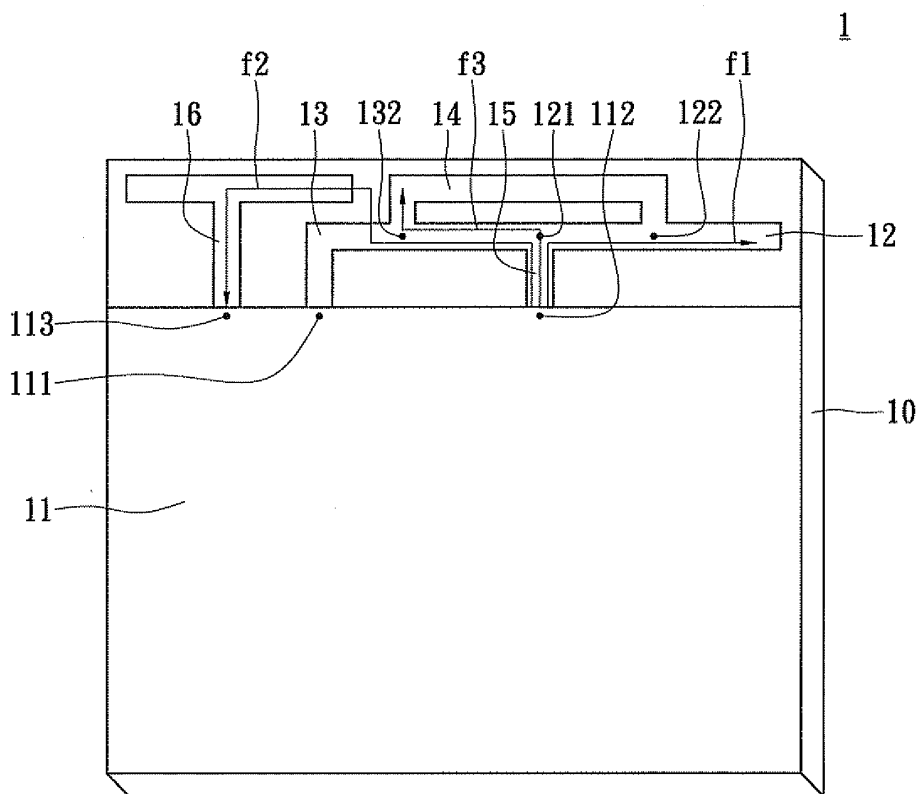
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US 20110227805A1

(19) **United States**(12) **Patent Application Publication**
WANG et al.(10) **Pub. No.: US 2011/0227805 A1**(43) **Pub. Date: Sep. 22, 2011**(54) **BROADBAND ANTENNA APPLIED TO
MULTIPLE FREQUENCY BAND**(52) **U.S. CL. 343/848; 343/700 MS**(75) **Inventors:** **CHUN-CHIEH WANG**, Taipei
City (TW); **Chih-Hsin Chiu**, Ji-An
Township (TW); **Chih-Ming Su**,
Taipei City (TW); **Chung-Ta Yu**,
Keelung City (TW)(57) **ABSTRACT**

A broadband antenna includes a substrate, a ground plane, a radiating path, a shorting path, a first connection path, a second connection path and a coupling path. The ground plane has a shorting point, a first grounding point and a second grounding point. The radiating path has a feeding point and a first connecting point. Two ends of the shorting path are respectively electrically connected with the shorting point and the feeding point, and the shorting path has a second connecting point. Two ends of the first connection path are respectively connected with the first connecting point and the second connecting point. Two ends of the second connection path are respectively connected with the first grounding point and the feeding point. One end of the coupling path is connected to the second grounding point and another end of the coupling path is separated from the shorting path.

(73) **Assignee:** **INPAQ TECHNOLOGY CO.,
LTD.**(21) **Appl. No.: 12/727,059**(22) **Filed: Mar. 18, 2010****Publication Classification**(51) **Int. Cl.**
H01Q 1/36 (2006.01)
H01Q 1/48 (2006.01)

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US 20110227806A1

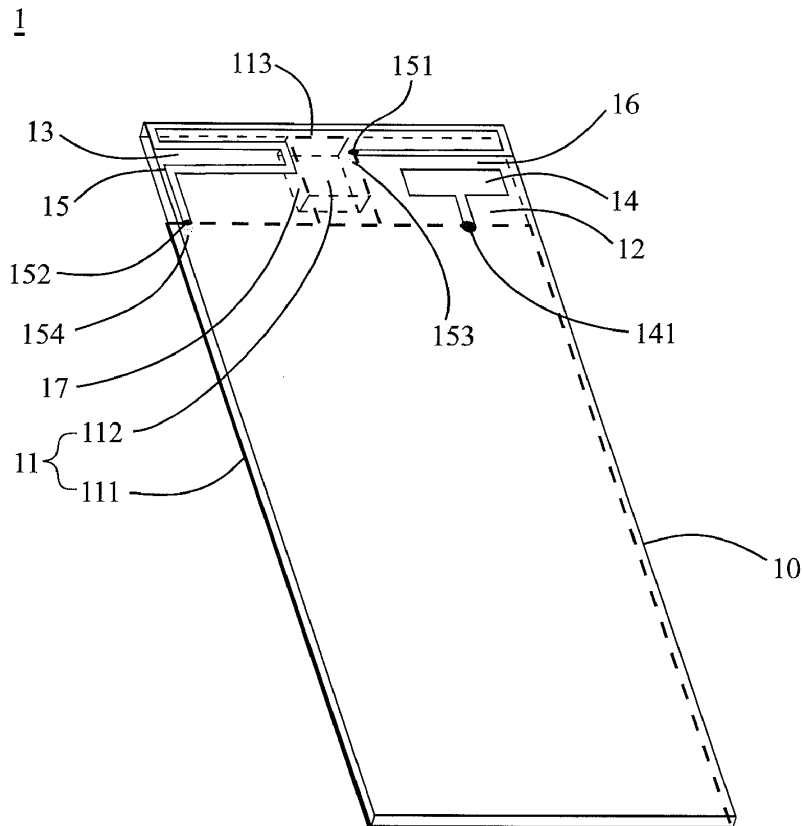
(19) **United States**(12) **Patent Application Publication**
Wong et al.(10) **Pub. No.: US 2011/0227806 A1**(43) **Pub. Date: Sep. 22, 2011**(54) **MOBILE COMMUNICATION DEVICE AND ANTENNA STRUCTURE**(76) Inventors: **Kin-Lu Wong**, Hsichih (TW);
Fang-Hsien Chu, Hsichih (TW)(21) Appl. No.: **12/849,066**(22) Filed: **Aug. 3, 2010**(30) **Foreign Application Priority Data**

Mar. 22, 2010 (TW) 099108373

Publication Classification(51) **Int. Cl.**
H01Q 1/38 (2006.01)(52) **U.S. Cl.** **343/848**(57) **ABSTRACT**

A mobile communication device and an antenna structure are provided. The mobile communication device includes an

antenna structure having a dielectric substrate and an antenna. The dielectric substrate comprises a ground portion, a first non-ground portion, and a second non-ground portion. The ground portion further includes a main ground and a protruded ground. The protruded ground is electrically connected to the main ground and extends between the first non-ground portion and the second non-ground portion, such that the first non-ground portion and the second non-ground portion are separated by the protruded ground. One edge of the protruded ground aligns with one edge of the dielectric substrate. The antenna is a planar structure located on the dielectric substrate. The antenna includes a feeding portion and a radiating portion. The feeding portion is located in the first non-ground portion. The radiating portion extends over the protruded ground, and has a first end located in the first non-ground portion and electrically connected to the main ground, and a second end of the radiating portion is located in the second non-ground portion and electrically connected to the main ground. There is a coupling gap between the radiating portion and the feeding portion in the first non-ground portion, and the radiating portion is excited by the capacitive coupling effect from the feeding portion.



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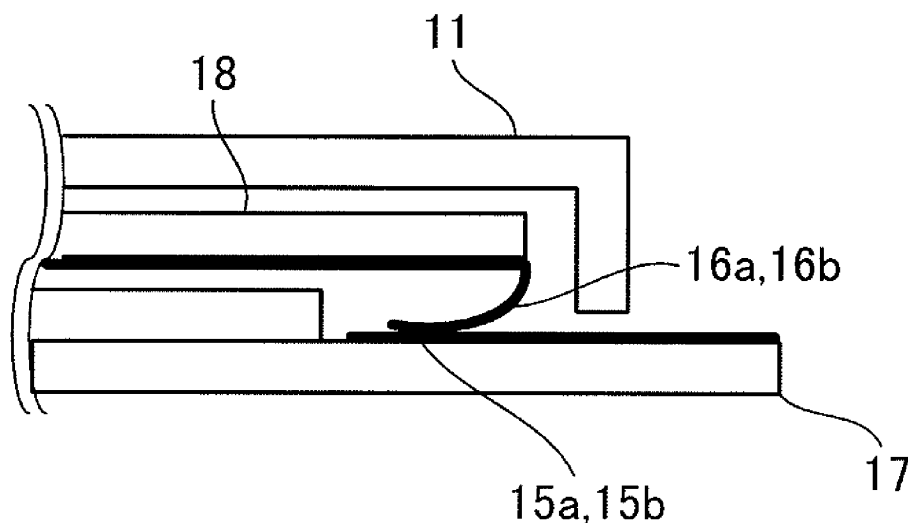
US 20110227808A1

(19) **United States**(12) **Patent Application Publication**
Takano et al.(10) **Pub. No.: US 2011/0227808 A1**(43) **Pub. Date: Sep. 22, 2011**(54) **ANTENNA DEVICE****Publication Classification**(75) Inventors: **Toshiyuki Takano**, Ishikawa (JP);
Yutaka Saito, Ishikawa (JP);
Masayuki Obata, Ishikawa (JP)(51) **Int. Cl.**
H01Q 1/50 (2006.01)(52) **U.S. Cl.** **343/906**(57) **ABSTRACT**(73) Assignee: **PANASONIC CORPORATION**,
Osaka (JP)

Provided is an antenna device, having a small and simple configuration, which reduces connection resistance in connections between a film antenna element and a power feeding unit. An antenna device comprises a nonconductive transparent film, which is an insulating substrate having a prescribed optical transmission factor, an antenna element that is formed, upon the transparent film, from transparent conductive material, which is a conductive material having a prescribed optical transmission factor, and a non-transparent conductive power feeding wire. The transparent film and the transparent conductive material are doubled over and pressed upon a portion of one side of the antenna element, which forms a square dipole antenna, such that the transparent conductive material is on the inside, and the power feeding wire is sandwiched therein. By being doubled over, the transparent conductive material has an overlap portion, the two sides whereof electrically connect to one other.

(21) Appl. No.: **13/131,093**(22) PCT Filed: **Oct. 6, 2010**(86) PCT No.: **PCT/JP2010/005989**§ 371 (c)(1),
(2), (4) Date:**May 25, 2011**(30) **Foreign Application Priority Data**

Oct. 21, 2009 (JP) 2009-242575



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