



US 20100253579A1

(19) **United States**(12) **Patent Application Publication****Ryou et al.**(10) **Pub. No.: US 2010/0253579 A1**(43) **Pub. Date: Oct. 7, 2010**(54) **ANTENNA WITH 3-D CONFIGURATION**(30) **Foreign Application Priority Data**

(76) Inventors: **Byung Hoon Ryou**, Seoul (KR);
Won Mo Sung, Gyeonggi-do (KR);
Gi Seck Seung, Gyeonggi-do (KR)

Jun. 30, 2006 (KR) 10-2006-0060320

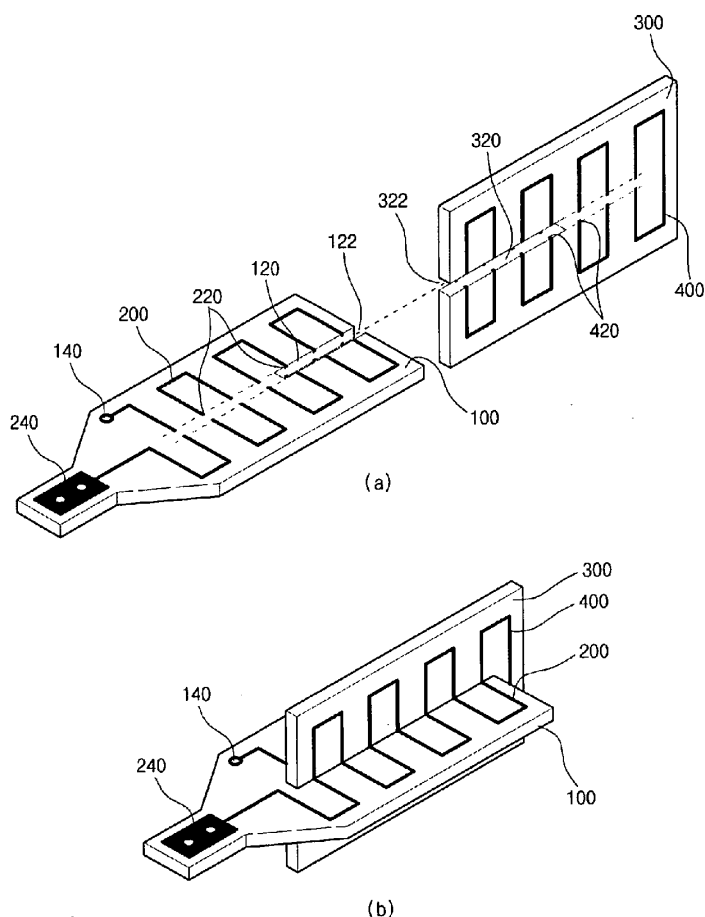
Publication Classification(51) **Int. Cl.**
H01Q 1/38 (2006.01)(52) **U.S. Cl.** **343/700 MS**(57) **ABSTRACT**

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**BLAKELY SOKOLOFF TAYLOR & ZAFMAN
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(21) Appl. No.: **12/308,652**(22) PCT Filed: **Jun. 27, 2007**(86) PCT No.: **PCT/KR2007/003106**

§ 371 (c)(1),
(2), (4) Date: **Jun. 15, 2010**

Disclosed herein is an antenna comprising: a first dielectric element having a first slit formed thereon; a first radiator formed on the first dielectric element; a second dielectric element coupled to the first dielectric element in such a fashion as to be fit into the first slit of the first dielectric element; and a second radiator formed on the second dielectric element and coupled electrically with the first radiator through the coupling between the first dielectric element and the second dielectric element. The present invention provides an antenna which can maximize an electrical length thereof in a limited space, can be designed even in a three-dimensional space, and can be fabricated simply at low cost.



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US 20100253580A1

(19) **United States**(12) **Patent Application Publication****YAN et al.**(10) **Pub. No.: US 2010/0253580 A1**(43) **Pub. Date: Oct. 7, 2010**(54) **PRINTED ANTENNA AND ELECTRONIC
DEVICE EMPLOYING THE SAME**(30) **Foreign Application Priority Data**

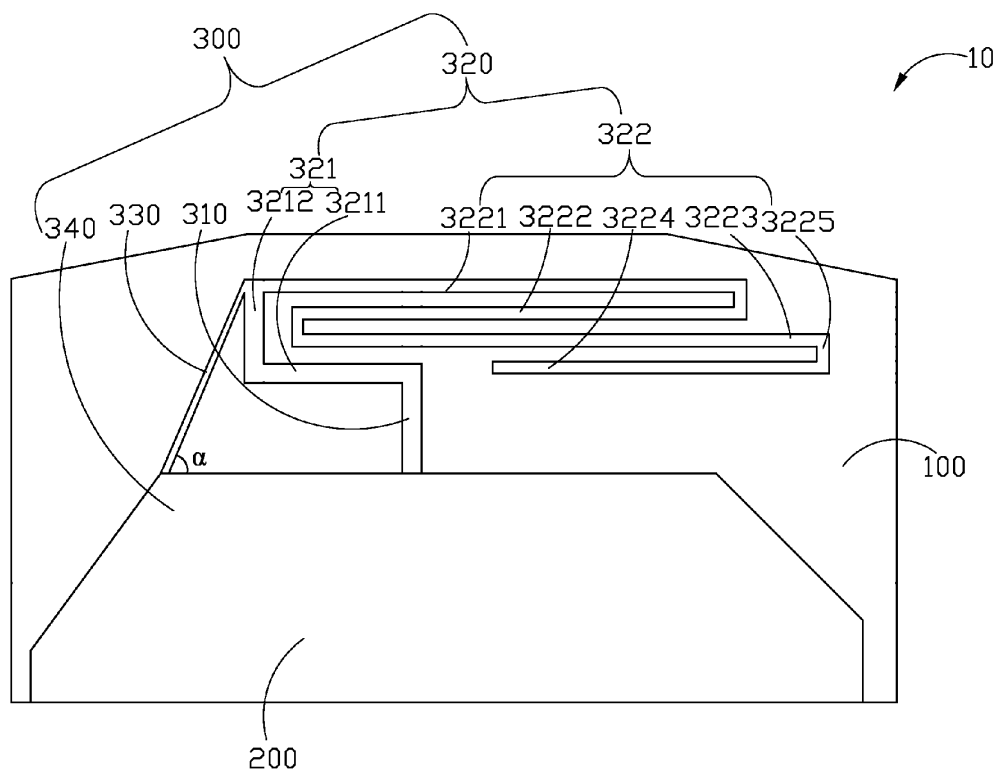
Apr. 2, 2009 (CN) 200920301870.7

(75) Inventors: **Tao YAN**, Shenzhen City (CN);
Dong WEI, Shenzhen City (CN)**Publication Classification**(51) **Int. Cl.**
H01Q 1/38 (2006.01)(52) **U.S. Cl.** **343/700 MS**(57) **ABSTRACT**

Correspondence Address:

Altis Law Group, Inc.**ATTN: Steven Reiss****288 SOUTH MAYO AVENUE****CITY OF INDUSTRY, CA 91789 (US)**(73) Assignees: **HONG FU JIN PRECISION
INDUSTRY (ShenZhen) CO.,
LTD.**, Tu-Cheng (CN); **HON HAI
PRECISION INDUSTRY CO.,
LTD.**, Tu-Cheng (TW)(21) Appl. No.: **12/430,109**(22) Filed: **Apr. 27, 2009**

A printed antenna includes a feeding portion, a radiating portion, a grounding portion, and a short portion. The feeding portion is operable to feed electromagnetic signals. The radiating portion is connected to the feeding portion, to radiate the electromagnetic signals. The radiating portion includes a first radiator and a second radiator. The first radiator is "L" shape, with a first end electrically connected to the feeding portion. The second radiator is formed by a plurality of radiating sections connected one by one. A first end of the second radiator is connected to a second end of the first radiator, a second end of the second radiator is floating and facing the feeding portion. A first end of the short portion is connected to a common node of the first radiator and the second radiator, and a second end of the short portion is connected to the grounding portion.



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US 20100254482A1

(19) **United States**

(12) **Patent Application Publication**
WANG

(10) **Pub. No.: US 2010/0254482 A1**

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

(54) **DIGITAL BROADCASTING ANTENNA
STRUCTURE**

Publication Classification

(51) **Int. Cl.**
H04L 27/00 (2006.01)

(52) **U.S. Cl.** **375/295**

(57) **ABSTRACT**

(76) Inventor: **Gary WANG**, Taoyuan County
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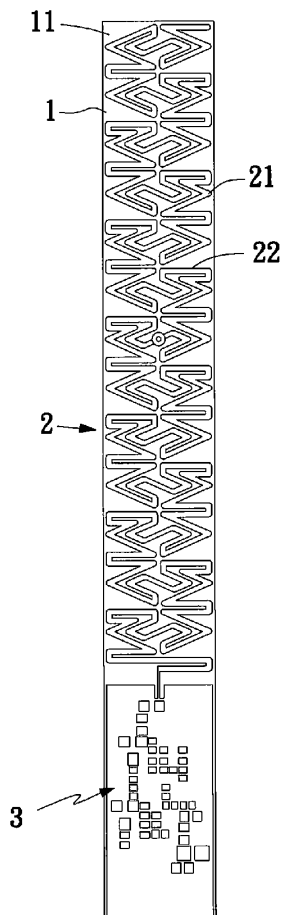
A digital broadcasting antenna structure includes a substrate having at least a first and a second face; a main antenna arranged on the first face; an amplifier arranged on the first face and electrically connected to the main antenna; a compensating unit arranged on the second face and electrically connected to the main antenna; a bandwidth modulating unit arranged on the second face and electrically connected to the compensating unit; and a grounding section arranged on the second face and electrically connected to the bandwidth modulating unit. The digital broadcasting antenna structure can receive digital broadcasting signals without being restricted to any specific receiving direction, and is applicable to low, intermediate and high frequency bands to therefore achieve the effects of miniaturization, high bandwidth and low return loss.

(21) Appl. No.: **12/724,017**

(22) Filed: **Mar. 15, 2010**

(30) **Foreign Application Priority Data**

Apr. 3, 2009 (TW) 0982005406



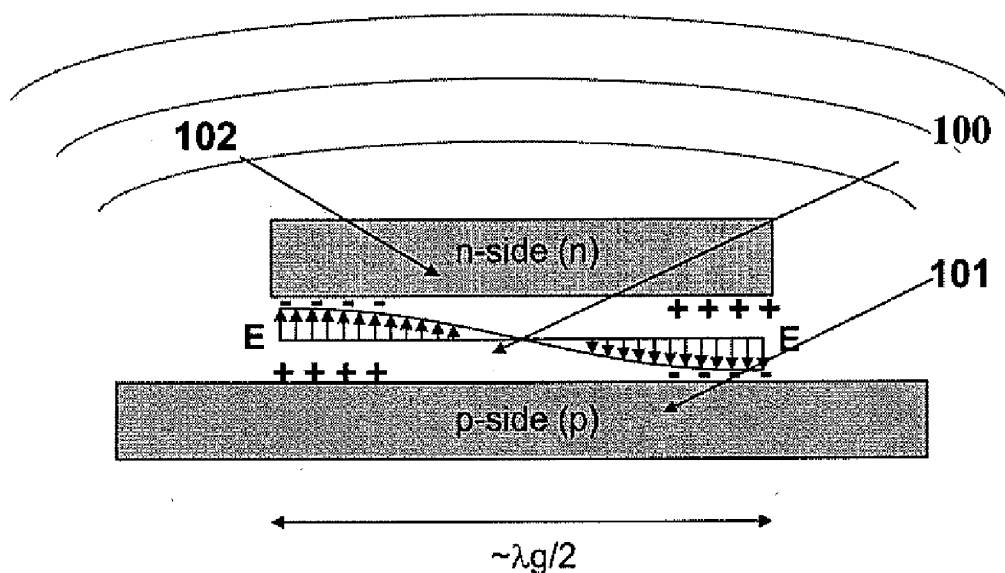
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US 20100258919A1

(19) **United States**(12) **Patent Application Publication**
Makarov et al.(10) **Pub. No.: US 2010/0258919 A1**(43) **Pub. Date: Oct. 14, 2010**(54) **SEMICONDUCTOR PATCH ANTENNA****Related U.S. Application Data**(75) Inventors: **Sergey N. Makarov**, Holden, MA (US); **Reinhold Ludwig**, Paxton, MA (US); **Francesca Scire-Scappuzzo**, Lexington, MA (US); **John McNeill**, Stow, MA (US)

(60) Provisional application No. 61/168,119, filed on Apr. 9, 2009.

Publication Classification(51) **Int. Cl.**
H01L 29/868 (2006.01)
H01L 21/329 (2006.01)(52) **U.S. Cl.** **257/656**; 438/478; 257/E29.336;
257/E21.352Correspondence Address:
BURNS & LEVINSON, LLP
125 SUMMER STREET
BOSTON, MA 02110 (US)(57) **ABSTRACT**(73) Assignee: **Worcester Polytechnic Institute**,
Worcester, MA (US)(21) Appl. No.: **12/757,506**(22) Filed: **Apr. 9, 2010**A semiconductor patch antenna for microwave radiation having a wide pin-junction or pn-junction with the depletion region or embodiments having a separating buried oxide (SiO₂) layer between p- and n-doped regions as the natural resonator volume. Embodiments that do not include a metal ground plane and/or a metal patch are disclosed.

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US 20100259454A1

(19) **United States**(12) **Patent Application Publication****Rahola et al.**(10) **Pub. No.: US 2010/0259454 A1**(43) **Pub. Date: Oct. 14, 2010**(54) **MECHANICALLY TUNABLE ANTENNA FOR COMMUNICATION DEVICES****Publication Classification**(76) Inventors: **Jussi Rahola**, Espoo (FI); **Jani Ollikainen**, Helsinki (FI); **Keniche Hashizume**, Kitagunma-gun (JP); **Matti Ryynanen**, Helsinki (FI)(51) **Int. Cl.**
H01Q 9/00 (2006.01)
H01Q 1/24 (2006.01)
(52) **U.S. Cl.** **343/702; 343/749**(57) **ABSTRACT**

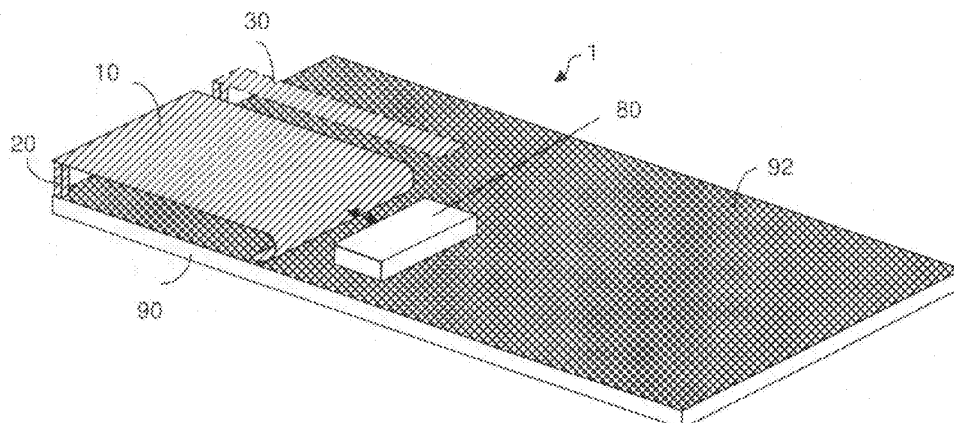
Correspondence Address:

WARE FRESSOLA VAN DER SLUYS & ADOLPHSON, LLP
BRADFORD GREEN, BUILDING 5, 755 MAIN STREET, P O BOX 224
MONROE, CT 06468 (US)

A radio antenna assembly for use in a communication device has an antenna element disposed adjacent to a ground plane to form a physical relationship with the ground plane. A mechanical device is used to change the physical relationship for changing the operating impedance of the antenna element or shifting the frequency band of the antenna assembly. The physical relationship can be changed by mechanically changing the shape of the antenna element. When the antenna element comprises a first radiating element and a second radiating element disposed at a lateral distance from the first radiating element, the physical relationship can be changed by changing the distance. When a physical object is disposed between the antenna element and the ground plane, the physical relationship can be changed by moving or twisting the physical object. The object can be electrically conducting, dielectric or magnetic.

(21) Appl. No.: **12/803,094**(22) Filed: **Jun. 18, 2010****Related U.S. Application Data**

(62) Division of application No. 11/478,839, filed on Jun. 30, 2006, now Pat. No. 7,755,547.



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US 20100259456A1

(19) **United States**(12) **Patent Application Publication****Desclos et al.**(10) **Pub. No.: US 2010/0259456 A1**(43) **Pub. Date: Oct. 14, 2010**(54) **MULTI-LAYER REACTIVELY LOADED
ISOLATED MAGNETIC DIPOLE ANTENNA**

in-part of application No. 12/059,346, filed on Mar. 31, 2008, now Pat. No. 7,777,686.

(75) Inventors: **Laurent Desclos**, San Diego, CA (US); **Sebastian Rowson**, San Diego, CA (US); **Jeffrey Shamblin**, San Diego, CA (US); **Young Cha**, San Diego, CA (US); **Chulmin Han**, San Diego, CA (US); **Byoeng Sug Kwak**, Gunpo-si (KR)

(60) Provisional application No. 61/168,550, filed on Apr. 10, 2009.

Publication Classification(51) **Int. Cl.**
H01Q 9/28 (2006.01)
H01Q 1/00 (2006.01)(52) **U.S. Cl.** **343/730; 343/795**

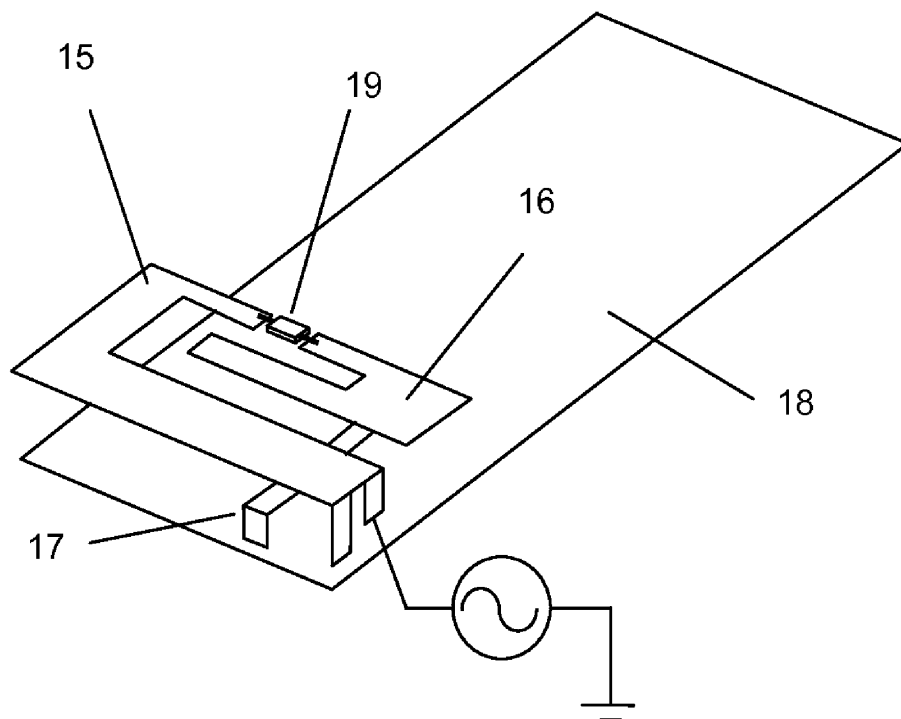
Correspondence Address:

Coastal Patent, LLC**P.O.BOX 232340****San Diego, CA 92193 (US)**(73) Assignee: **ETHERTRONICS, INC.**, San Diego, CA (US)(21) Appl. No.: **12/758,725**(22) Filed: **Apr. 12, 2010****Related U.S. Application Data**

(63) Continuation-in-part of application No. 11/847,207, filed on Aug. 29, 2007, now abandoned, Continuation-

ABSTRACT

A multi-layer reactively loaded isolated magnetic (IMD) dipole with improved bandwidth and efficiency characteristics to be used in wireless communications and other applicable systems. The multi-layer IMD antenna comprises a first element positioned above a ground plane, a second element positioned above a ground plane and coupled to the first portion. Reactive components are integrated into one or both elements to optimize the frequency response of the antenna. The range of frequencies covered to be determined by the shape, size, and number of elements in the physical configuration of the components. Portions of or the entire ground plane can be removed beneath the elements.



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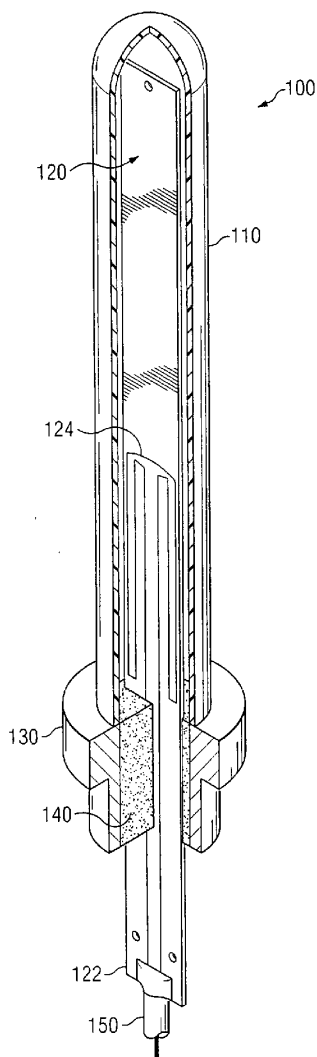
US 20100259461A1

(19) **United States**(12) **Patent Application Publication****Eisenbeis et al.**(10) **Pub. No.: US 2010/0259461 A1**(43) **Pub. Date: Oct. 14, 2010**(54) **ANTENNA APPARATUS FOR EXPLOSIVE ENVIRONMENTS****Publication Classification**(76) Inventors: **Clyde Thomas Eisenbeis**,
Marshalltown, IA (US); **Scott R. Kratzer**, Marshalltown, IA (US)(51) **Int. Cl.**
H01Q 1/40 (2006.01)(52) **U.S. Cl.** **343/873**

Correspondence Address:

HANLEY, FLIGHT & ZIMMERMAN, LLC
150 S. WACKER DRIVE, SUITE 2100
CHICAGO, IL 60606 (US)(57) **ABSTRACT**

Antenna assemblies for wireless communications in explosive environments are described. An example antenna assembly has a housing, a base member at one end of the housing, and an antenna extending through the base member and into the housing. A sealing compound within the base member encapsulates the antenna to seal the antenna at the base member.

(21) Appl. No.: **11/804,189**(22) Filed: **May 17, 2007**

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US 20100265141A1

(19) **United States**(12) **Patent Application Publication**
Hsu(10) **Pub. No.: US 2010/0265141 A1**(43) **Pub. Date: Oct. 21, 2010**(54) **ANTENNA AND WIRELESS TRANSCEIVER
USING THE SAME****Publication Classification**(75) Inventor: **Chia-Jui Hsu**, Hsinchu (TW)(51) **Int. Cl.**
H01Q 1/52 (2006.01)
H01Q 1/24 (2006.01)
(52) **U.S. Cl.** **343/702; 343/841**

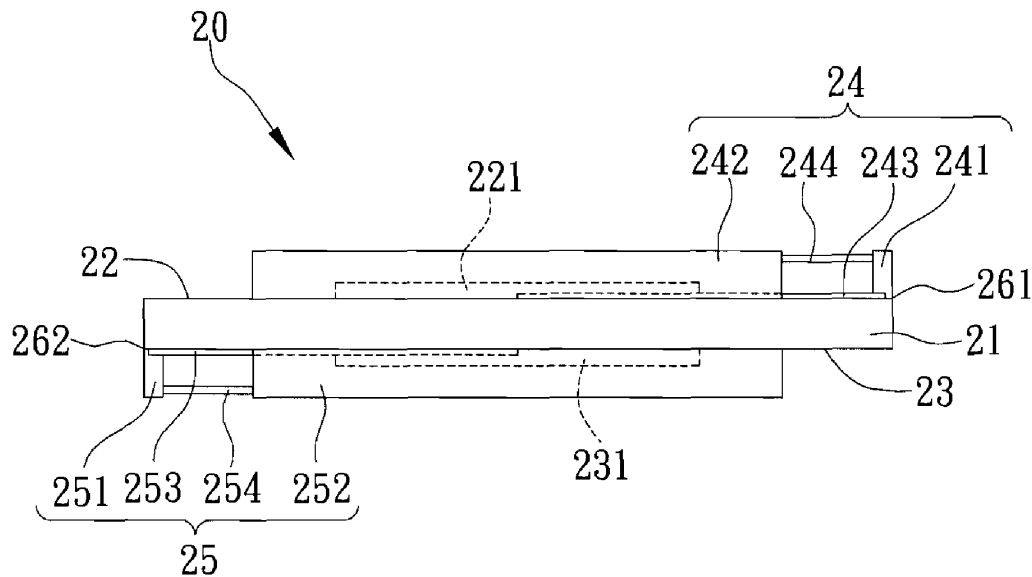
Correspondence Address:

EDWARDS ANGELL PALMER & DODGE LLP
P.O. BOX 55874
BOSTON, MA 02205 (US)(57) **ABSTRACT**(73) Assignee: **RALINK TECHNOLOGY
CORPORATION**, Hsinchu (TW)

An antenna and a wireless transceiver are provided. The antenna includes: a substrate having first and second surfaces with circuits thereon; and two shield boxes located on the first and second surfaces for covering the circuits thereon. The shield boxes each comprise an antenna section and a shield section. The antenna sections are disposed at one side of the shield section and aligned with a margin of the substrate, and include signal ends electrically connected to the circuits and grounding ends electrically connected to the shield sections. The first antenna section is disposed on a diagonal opposite of the second antenna section flush with substrate margin or aligned with the substrate margin, thereby maximizing the distance between the two antennas disposed on the substrate, and preventing the two antennas from electromagnetic interference. The antennas are disposed on sides of the shield sections flush with substrate margins and thereby are space-saving.

(21) Appl. No.: **12/427,120**(22) Filed: **Apr. 21, 2009**(30) **Foreign Application Priority Data**

Apr. 21, 2009 (TW) 097114435



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US 20100265142A1

(19) **United States**(12) **Patent Application Publication**
CHUNG et al.(10) **Pub. No.: US 2010/0265142 A1**(43) **Pub. Date: Oct. 21, 2010**(54) **DUAL-BAND ANTENNA AND ELECTRONIC
DEVICE EMPLOYING THE SAME****Publication Classification**(75) Inventors: **CHO-JU CHUNG**, Tu-Cheng
(TW); **TENG-HUEI CHU**,
Tu-Cheng (TW)(51) **Int. Cl.**
H01Q 9/04 (2006.01)
H01Q 1/24 (2006.01)(52) **U.S. Cl.** **343/702; 343/700 MS**

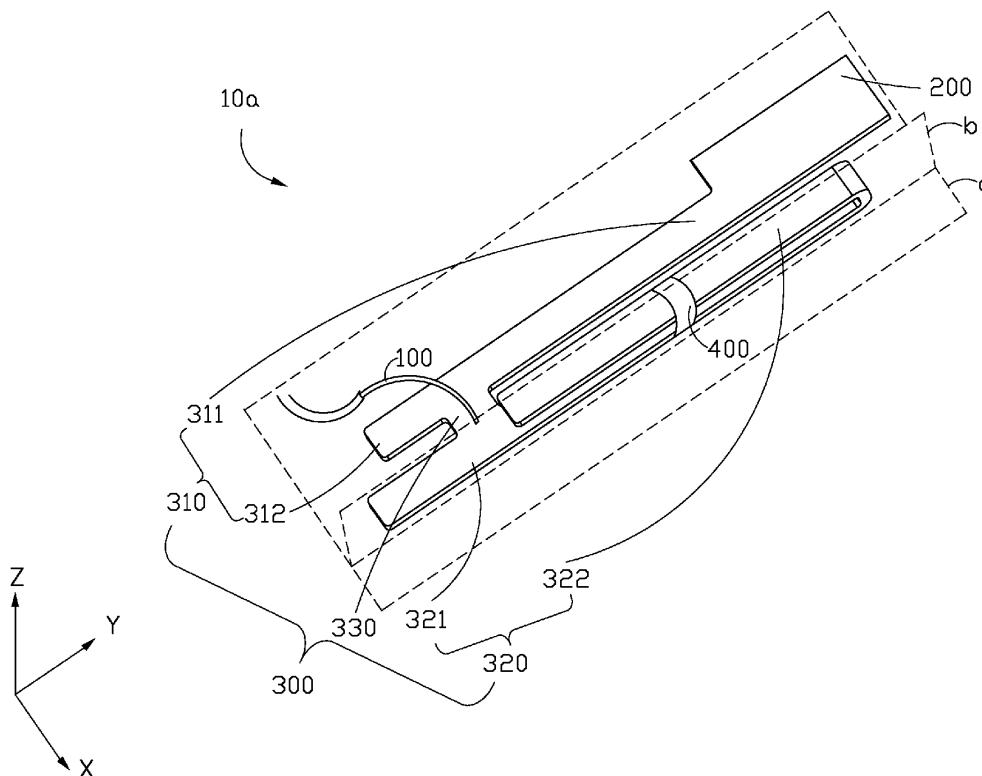
Correspondence Address:

Altis Law Group, Inc.**ATTN: Steven Reiss****288 SOUTH MAYO AVENUE****CITY OF INDUSTRY, CA 91789 (US)**(73) Assignee: **HON HAI PRECISION
INDUSTRY CO., LTD.**, Tu-Cheng
(TW)(21) Appl. No.: **12/471,392**(22) Filed: **May 24, 2009**(30) **Foreign Application Priority Data**

Apr. 16, 2009 (CN) 200920302267.0

(57) **ABSTRACT**

A dual-band antenna includes a feed portion, a ground portion, a radiating portion and a fine-tuning portion. The feed portion is operable to feed electromagnetic signals. The radiating portion includes a first radiator, a second radiator and a connecting portion. The first radiator is elongated and has a first end electrically connected to the ground portion, and a second end of the first radiator is floating. The second radiator is U shaped, with two open ends floating. The connecting portion is connected to the first radiator, the second radiator and the feed portion. The feed portion feeds electromagnetic signal to the first radiator and the second radiator via the connecting portion. The fine-tuning portion is arranged around the second radiator, operable to control operating frequency bands of the second radiator.



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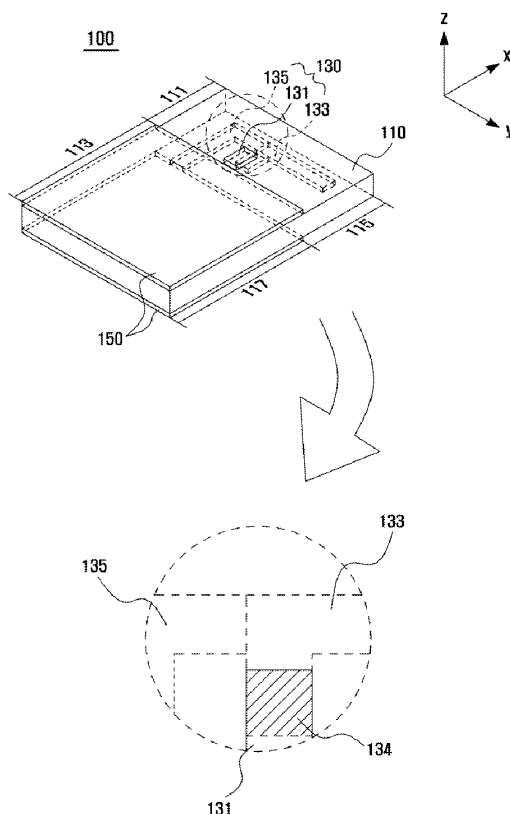
(19) **United States**(12) **Patent Application Publication**
KWAK et al.(10) **Pub. No.: US 2010/0265152 A1**(43) **Pub. Date: Oct. 21, 2010**(54) **MULTI-BAND ANTENNA APPARATUS****Publication Classification**(75) Inventors: **Yong Soo KWAK**, Suwon-si (KR);
Bum Jin CHO, Hwaseong-si (KR);
Joon Ho BYUN, Yongin-si (KR);
Seong Tae JEONG, Yongin-si
(KR); **Austin KIM**, Seongnam-si
(KR); **Sung Koo PARK**, Suwon-si
(KR)(51) **Int. Cl.**
H01Q 1/38 (2006.01)
H01Q 1/48 (2006.01)(52) **U.S. Cl.** **343/848; 343/700 MS**(57) **ABSTRACT**

A multi-band antenna apparatus using a multiple frequency band is provided. The apparatus includes a substrate body formed in a flat plate structure having a preset thickness and in which at least one dielectric plate is stacked, a power supply line, disposed at the substrate body and connected to an external power source, for forming an electromagnetic field when power is supplied from the external power source, a radiation line, separated from the power supply line using the dielectric plate as the boundary in the substrate body, for forming an overlapping area overlapped with the power supply line along one axis through at least a portion, and for resonating in a frequency band determined according to the overlapping area when the electromagnetic field is formed, and a ground plate disposed in at least one an upper ground area and a lower ground area of the substrate body, for grounding the radiation line by contacting with the radiation line.

Correspondence Address:

Jefferson IP Law, LLP
1130 Connecticut Ave., NW, Suite 420
Washington, DC 20036 (US)(73) Assignee: **Samsung Electronics Co. Ltd.**,
Suwon-si (KR)(21) Appl. No.: **12/755,780**(22) Filed: **Apr. 7, 2010**(30) **Foreign Application Priority Data**

Apr. 15, 2009 (KR) 10-2009-0032766



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US 20100265157A1

(19) **United States**(12) **Patent Application Publication****Yang et al.**(10) **Pub. No.: US 2010/0265157 A1**(43) **Pub. Date: Oct. 21, 2010**(54) **MULTI-BAND ANTENNA**(52) **U.S. CL. 343/908**

(76) Inventors: **Wen-Chieh Yang**, Tu-Cheng City (TW); **Kai Shih**, Tu-Cheng City (TW); **Yu-Yuan Wu**, Tu-Cheng City (TW)

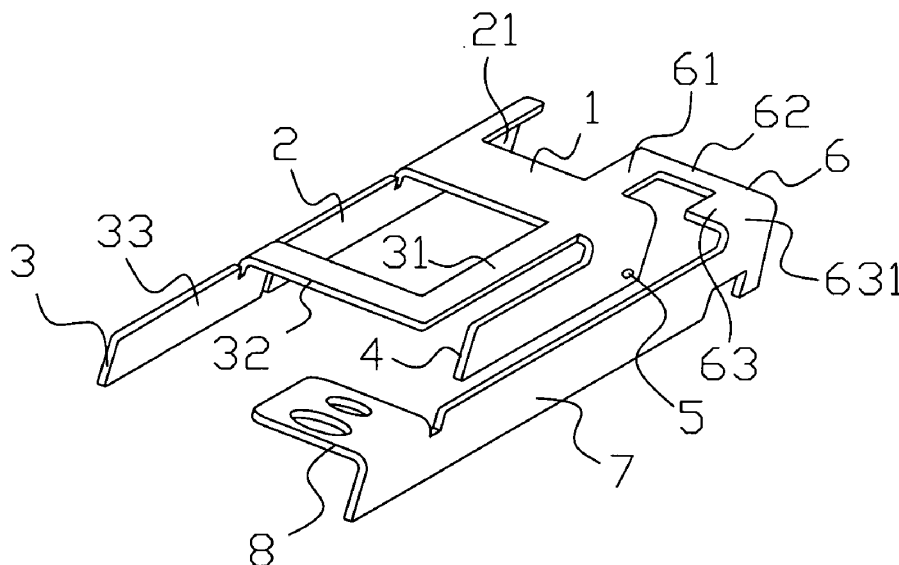
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ELLICOTT CITY, MD 21043 (US)

(21) Appl. No.: **12/385,773**(22) Filed: **Apr. 20, 2009****Publication Classification**

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

(57) **ABSTRACT**

A multi-band antenna includes a base plate having two opposite transverse edges and two opposite longitudinal edges respectively connected to the two transverse edges. A high frequency radiating element and a capacitance element are respectively bent downward from the two transverse edges of the base plate and then extend in a transverse direction. A feeding point is defined at one end of the capacitance element adjacent to the base plate. A low frequency radiating element extends from one longitudinal edge of the base plate. An inductance element extends from the other longitudinal edge of the base plate and has a transverse border exceeding the base plate in a longitudinal direction. A grounding element is bent downward from the transverse border of the inductance element and then extends in the same direction as the high frequency radiating element to be spaced from the capacitance element.

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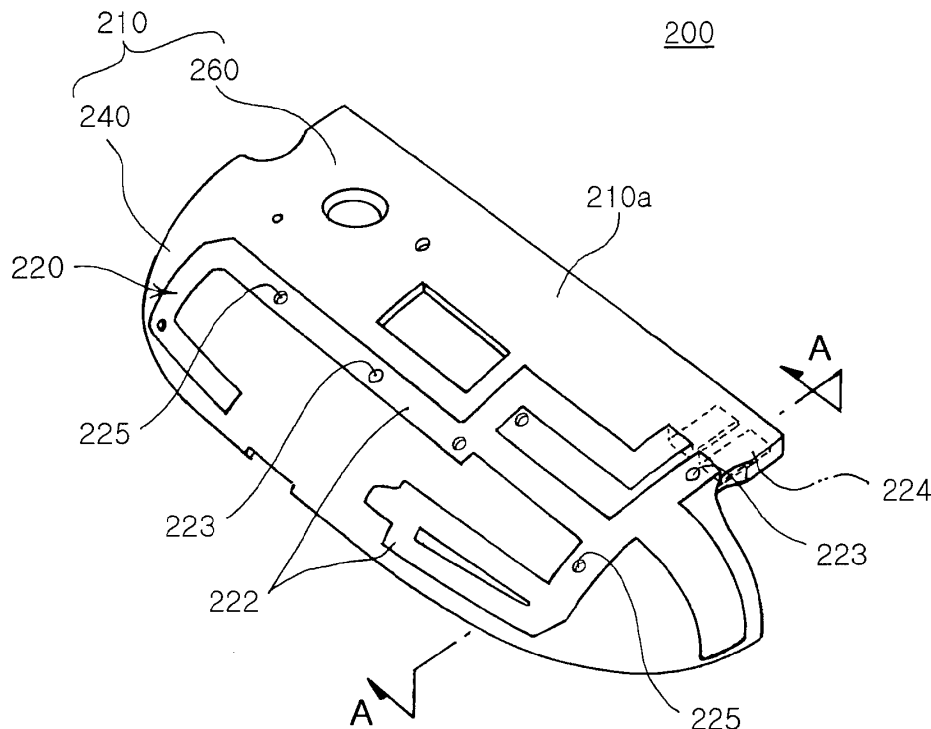
(19) **United States**(12) **Patent Application Publication****SUNG et al.**(10) **Pub. No.: US 2010/0271265 A1**(43) **Pub. Date: Oct. 28, 2010**(54) **ANTENNA PATTERN FRAME AND METHOD
AND MOLD FOR MANUFACTURING THE
SAME**(30) **Foreign Application Priority Data**

Apr. 23, 2009 (KR) 10-2009-0035633

(75) Inventors: **Jae Suk SUNG**, Yongin (KR); **Ha
Ryong HONG**, Hwaseong (KR);
Yong Shik NA, Hwaseong (KR);
Dae Seong JEON, Suwon (KR);
Duk Woo LEE, Suwon (KR); **Dae
Kyu LEE**, Suwon (KR); **Sang Woo
BAE**, Suwon (KR); **Dae Ki LIM**,
Seongnam (KR); **Sung Eun CHO**,
Suwon (KR); **Nam Il SEO**, Seoul
(KR)**Publication Classification**(51) **Int. Cl.**
H01Q 1/38 (2006.01)
B29C 45/14 (2006.01)(52) **U.S. Cl.** **343/700 MS; 264/272.15; 425/577**(57) **ABSTRACT**

An antenna pattern frame according to an aspect of the invention may include: a radiator having an antenna pattern portion transmitting and receiving a signal and a connection terminal portion allowing the signal to be transmitted to and received from a circuit board of an electronic device; a connection portion partially forming the radiator and connecting the antenna pattern portion and the connection terminal portion to be arranged in different planes; and a radiator frame manufactured by injection molding on the radiator so that the antenna pattern portion is provided on one side of the radiator frame and the connection terminal portion is provided on the other side thereof while the antenna pattern portion is embedded in the electronic device case.

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ALEXANDRIA, VA 22314 (US)

(73) Assignee: **Samsung Electro-Mechanics Co.,
Ltd.**, Suwon (KR)(21) Appl. No.: **12/649,912**(22) Filed: **Dec. 30, 2009**

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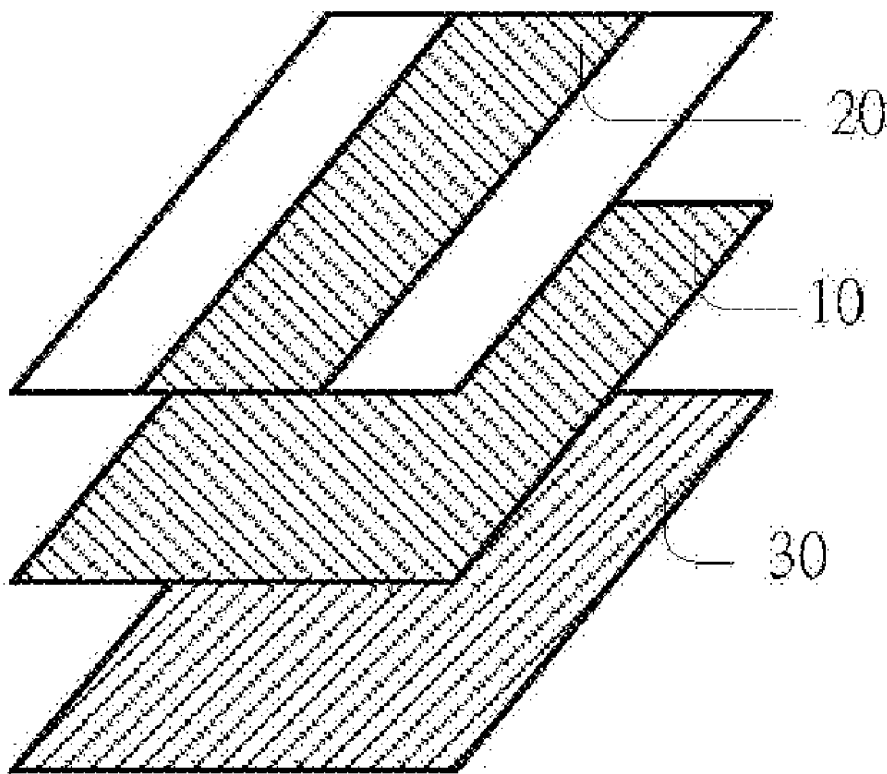


US 20100271266A1

(19) **United States**(12) **Patent Application Publication****Lai et al.**(10) **Pub. No.: US 2010/0271266 A1**(43) **Pub. Date: Oct. 28, 2010**(54) **MINIATURE WIRE ANTENNA****Publication Classification**(75) Inventors: **Ming-Iu Lai**, Taipei (TW);
Chun-Hsiung Wang, Taipei (TW)(51) **Int. Cl.**
H01Q 9/04 (2006.01)Correspondence Address:
WPAT, PC
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7225 BEVERLY ST.
ANNANDALE, VA 22003 (US)(52) **U.S. CL.** **343/700 MS**(73) Assignee: **ASUSTeK COMPUTER INC.,**
TAIPEI (TW)(57) **ABSTRACT**(21) Appl. No.: **12/725,750**(22) Filed: **Mar. 17, 2010**(30) **Foreign Application Priority Data**

Apr. 24, 2009 (TW) 098113697

A miniature wire antenna includes N rectangular metal plates located at a first layer of a PCB, a tunable metal plate located at the first layer of the PCB and N serpent lines located at a second layer of the PCB. The positions of the N serpent lines correspond to the positions of the rectangular metal plates. A first end of each of the serpent lines is connected to the corresponding rectangular metal plate, and a second end of each of the serpent lines is connected to the next rectangular metal plate. A first end of the last serpent line is connected to the corresponding rectangular metal plate, and a second end of the last serpent line is connected to the tunable metal plate.



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US 20100271270A1

(19) **United States**(12) **Patent Application Publication**
SUNG et al.(10) **Pub. No.: US 2010/0271270 A1**(43) **Pub. Date: Oct. 28, 2010**(54) **ELECTRONIC DEVICE CASE, METHOD AND MOLD FOR MANUFACTURING THE SAME, AND MOBILE COMMUNICATIONS TERMINAL**(30) **Foreign Application Priority Data**

Apr. 23, 2009 (KR) 10-2009-0035635

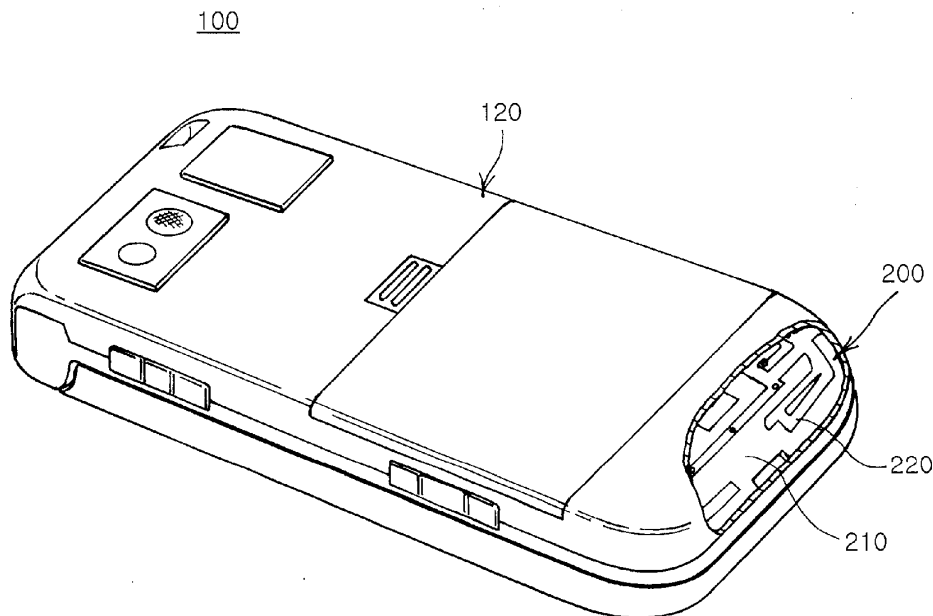
Publication Classification(75) Inventors: **Jae Suk SUNG**, Yongin (KR); **Sung Eun Cho**, Suwon (KR); **Ha Ryong Hong**, Hwaseong (KR); **Dae Kyu Lee**, Suwon (KR); **Dae Seong Jeon**, Suwon (KR); **Ki Won Chang**, Suwon (KR); **Tae Sung Kim**, Seoul (KR); **Dae Ki Lim**, Seongnam (KR); **Hyun Do Park**, Yongin (KR); **Nam Il Seo**, Seoul (KR)(51) **Int. Cl.****H01Q 1/40** (2006.01)**H01Q 1/24** (2006.01)**B29C 45/14** (2006.01)**B29C 45/00** (2006.01)(52) **U.S. Cl.** **343/702**; 343/873; 264/272.11; 425/542

(57)

ABSTRACT

An electronic device case having an antenna pattern embedded therein according to an aspect of the invention may include: a radiator having an antenna pattern portion transmitting and receiving a signal and a connection terminal portion allowing the signal to be transmitted to and received from a circuit board of an electronic device; a connection portion partially forming the radiator and connecting the antenna pattern portion and the connection terminal portion to be arranged in different planes; a radiator frame manufactured by injection molding on the radiator so that the antenna pattern portion of the radiator is provided on one side of the radiator frame and the connection terminal portion is provided on the other side thereof; and a case frame covering the one side of the radiator frame on which the antenna pattern portion is provided so that the antenna pattern portion is embedded between the case frame and the radiator frame.

Correspondence Address:

LOWE HAUPTMAN HAM & BERNER, LLP
1700 DIAGONAL ROAD, SUITE 300
ALEXANDRIA, VA 22314 (US)(73) Assignee: **Samsung Electro-Mechanics Co., Ltd.**, Suwon (KR)(21) Appl. No.: **12/608,818**(22) Filed: **Oct. 29, 2009**

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US 20100271271A1

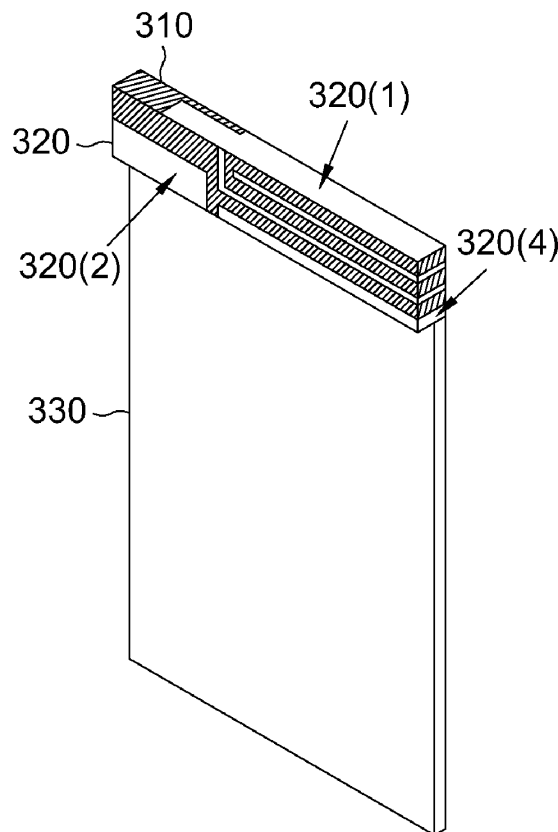
(19) **United States**(12) **Patent Application Publication**
Wu(10) **Pub. No.: US 2010/0271271 A1**(43) **Pub. Date: Oct. 28, 2010**(54) **MULTI-LOOP ANTENNA STRUCTURE AND
HAND-HELD ELECTRONIC DEVICE USING
THE SAME****Publication Classification**(51) **Int. Cl.**
H01Q 11/12 (2006.01)
H01Q 1/24 (2006.01)(75) **Inventor: Wei-Yang Wu, Taoyuan (TW)**(52) **U.S. Cl. 343/702; 343/742**(57) **ABSTRACT**

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County (TW)**(21) **Appl. No.: 12/634,704**(22) **Filed: Dec. 10, 2009**(30) **Foreign Application Priority Data**

Apr. 27, 2009 (TW) 098113943

A multi-loop antenna structure and a hand-held electronic device using the same are provided. The multi-loop antenna structure includes a high-frequency radiating body, a low-frequency radiating body, a feeding connecting part and a grounding connecting part. The feeding connecting part electrically connects one terminal of the high-frequency and the low-frequency radiating body to a feeding point. The grounding connecting part grounds the other terminal of the high-frequency and the low-frequency radiating body. The feeding connecting part forms a first folded loop antenna with the high-frequency radiating body and the grounding connecting part for resonating at a first frequency band. The feeding connecting part forms a second folded loop antenna with the low-frequency radiating body and the grounding connecting part for resonating at a second, a third and a fourth frequency band. The first folded loop antenna and the second folded loop antenna are folded for forming a three-dimensional structure.



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US 20100271272A1

(19) **United States**(12) **Patent Application Publication****Sung et al.**(10) **Pub. No.: US 2010/0271272 A1**(43) **Pub. Date: Oct. 28, 2010**(54) **ANTENNA PATTERN FRAME, METHOD AND MOLD FOR MANUFACTURING THE SAME, AND ELECTRONIC DEVICE**(30) **Foreign Application Priority Data**

Apr. 23, 2009 (KR) 10-2009-0035637

(75) Inventors: **Jae Suk Sung**, Yongin (KR); **Ki Won Chang**, Suwon (KR); **Ha Ryong Hong**, Hwaseong (KR); **Chang Mok Han**, Chungcheongnam-do (KR); **Chan Gwang An**, Suwon (KR); **Duk Woo Lee**, Suwon (KR); **Hyun Kil Nam**, Suwon (KR); **Dae Kyu Lee**, Suwon (KR); **Sang Woo Bae**, Suwon (KR); **Byung Hwa Lee**, Suwon (KR)

Publication Classification

(51) **Int. Cl.**
H01Q 1/40 (2006.01)
H01Q 1/24 (2006.01)
B29C 45/14 (2006.01)
B29C 45/00 (2006.01)
(52) **U.S. Cl.** **343/702**; 343/873; 264/261; 425/542; 343/700 MS

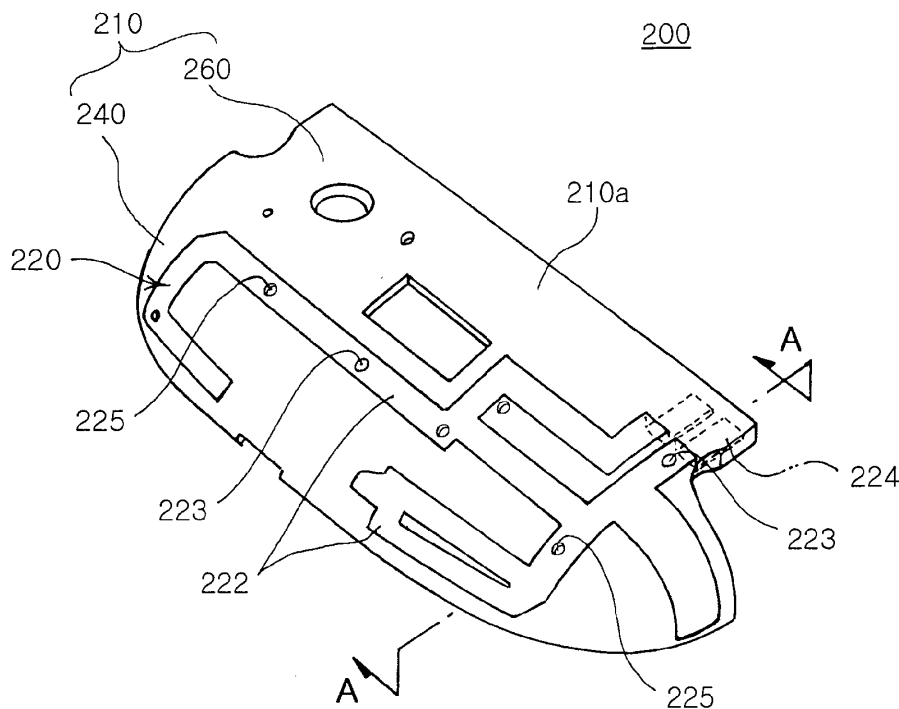
(57) **ABSTRACT**

An antenna pattern frame according to an aspect of the invention may include: a radiator having an antenna pattern portion transmitting and receiving a signal; a ground portion extending from the antenna pattern portion; a connection portion connecting the antenna pattern portion and the ground portion to be arranged in different planes; and a radiator frame manufactured by injection molding on the radiator so that the antenna pattern portion may be provided on one side of the radiator frame and the connection terminal portion may be provided on the other side thereof, the radiator frame allowing the antenna pattern portion to be embedded in the electronic device case.

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(21) Appl. No.: **12/649,820**(22) Filed: **Dec. 30, 2009**

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US 20100271277A1

(19) **United States**(12) **Patent Application Publication****Kao et al.**(10) **Pub. No.: US 2010/0271277 A1**(43) **Pub. Date: Oct. 28, 2010**(54) **SLOT ANTENNA**(22) Filed: **Aug. 25, 2009**

(75) Inventors: **Yu-Chang Kao**, Taipei County (TW); **Hua-Ming Chen**, Taipei County (TW); **Yang-Kai Wang**, Taipei County (TW); **Yi-Fang Lin**, Taipei County (TW); **Chien-Hung Chen**, Taipei County (TW); **Ya-Ping Chen**, Taipei County (TW)

(30) **Foreign Application Priority Data**

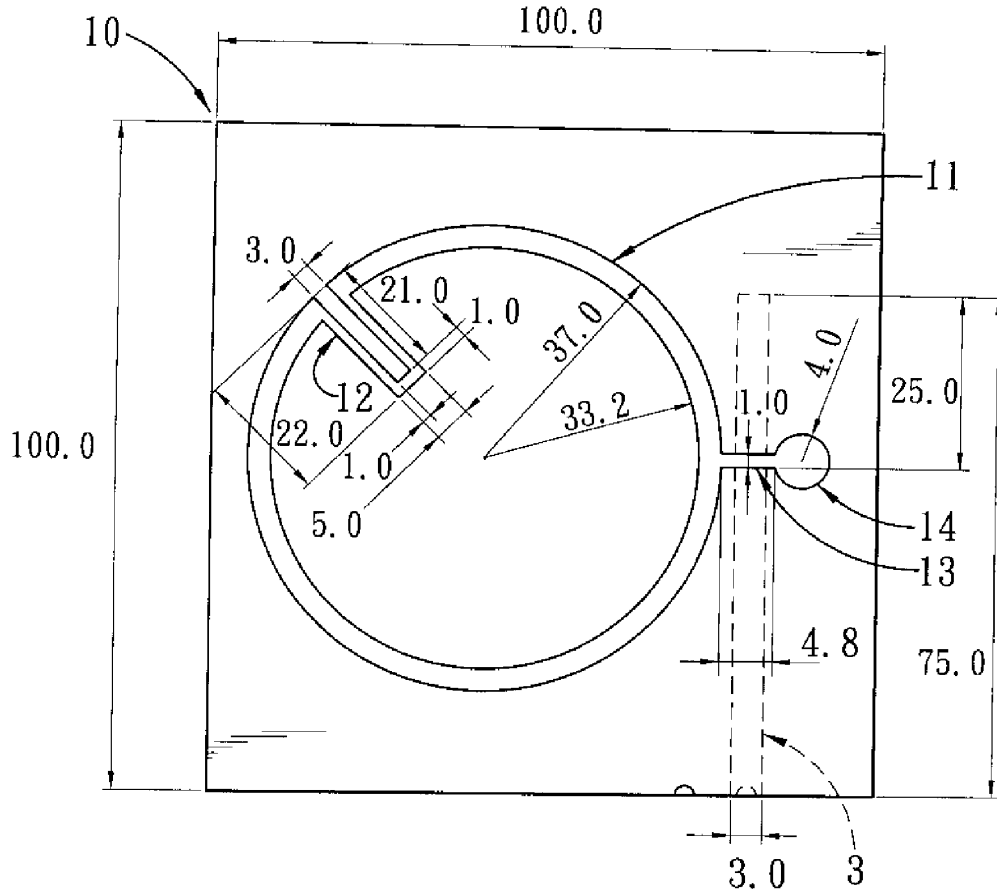
Apr. 28, 2009 (TW) 098114018

Publication Classification(51) **Int. Cl.**
H01Q 13/10 (2006.01)(52) **U.S. Cl.** **343/767**(57) **ABSTRACT**

A slot antenna includes a dielectric substrate, and an antenna body that is formed on the dielectric substrate. The antenna body defines an open loop antenna slot that has first and second ends, and an open loop perturbation slot that extends inwardly from the open loop antenna slot, and that has first and second ends, each of which is connected to a respective one of the first and second ends of the open loop antenna slot.

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(21) Appl. No.: **12/546,685**

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US 20100271279A1

(19) **United States**

(12) **Patent Application Publication**
Johnson

(10) **Pub. No.: US 2010/0271279 A1**

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

(54) **ANTENNA SYSTEM HAVING COMPACT PIFA
RESONATOR WITH OPEN SECTIONS**

Publication Classification

(76) Inventor: **Greg F. Johnson, Aptos, CA (US)**

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

(52) **U.S. Cl.** **343/845**

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(57) **ABSTRACT**

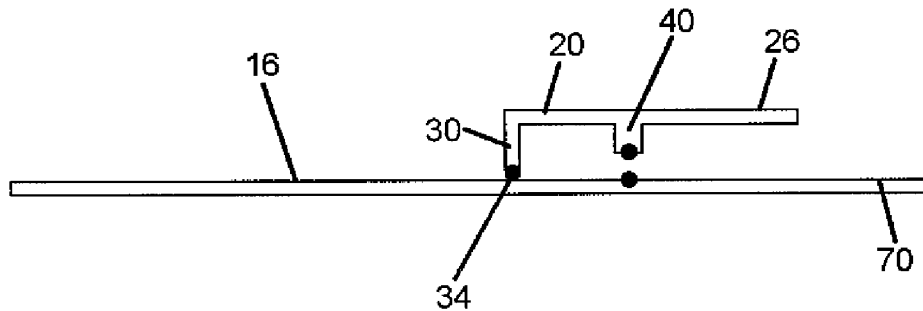
A low-height PIFA-fed antenna system having high gain, wide bandwidth and wide beamwidth for applications on wireless communications devices. The antenna is suitable for internal installation within a handset, such as a cellphone. The antenna includes a ground plane conductor, such as the ground plane of a wireless device, and a resonator element having a top portion with a split free end defining an open space. The antenna is well adapted for high volume manufacturing processes using conventional fabrication techniques such as metal stamping or selectively plated plastic.

(21) Appl. No.: **12/576,908**

(22) Filed: **Oct. 9, 2009**

Related U.S. Application Data

(60) Provisional application No. 61/104,255, filed on Oct. 9, 2008.



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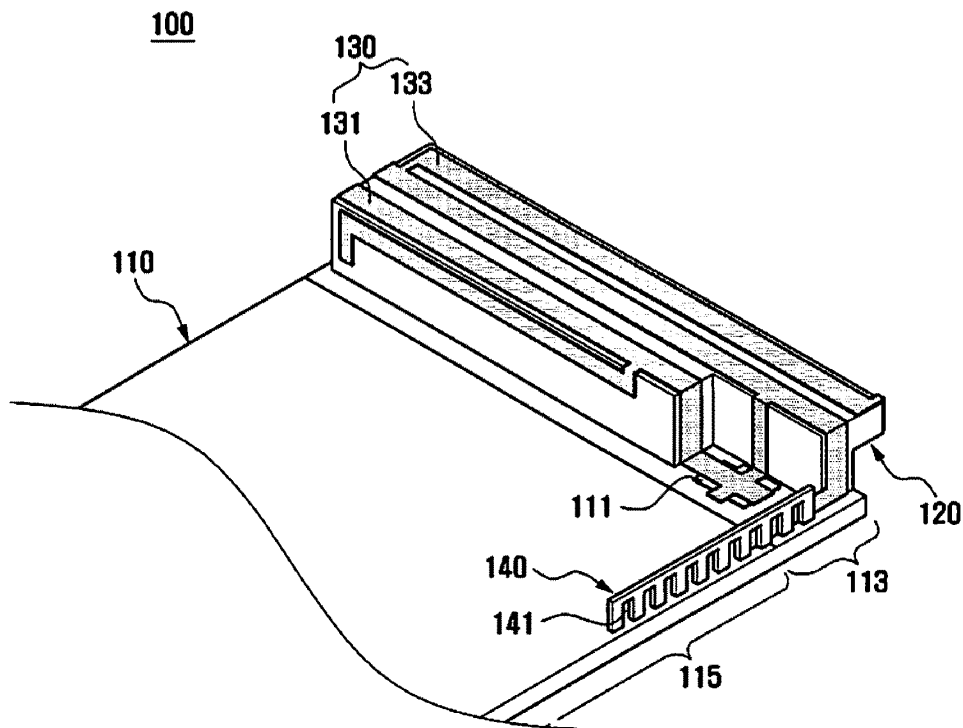
US 20100271282A1

(19) **United States**(12) **Patent Application Publication**
EOM et al.(10) **Pub. No.: US 2010/0271282 A1**(43) **Pub. Date: Oct. 28, 2010**(54) **EMBEDDED ANTENNA APPARATUS****Publication Classification**(75) Inventors: **Sang Jin EOM**, Gyeyang-gu (KR);
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H01Q 1/40 (2006.01)(52) **U.S. CL.** **343/873**Correspondence Address:
THE FARRELL LAW FIRM, LLP
290 Broadhollow Road, Suite 210E
Melville, NY 11747 (US)(57) **ABSTRACT**

An embedded antenna apparatus of a communication terminal is provided. The antenna apparatus includes a plate board having a feeding pad disposed on a side of the board; a device carrier mounted on a side of the board to expose the feeding pad; a radiation device including at least two radiation lines extending from the feeding pad to a surface of the device carrier along different paths, the at least two radiation lines radiating at a preset frequency band when electric power is fed through the feeding pad; and a ground plate having a flat plate shape mounted in an edge of the side of the board and disposed perpendicular to the side of the board, and contacting one end each of the at least two radiation lines to ground the radiation device.

(73) Assignee: **Samsung Electronics Co., Ltd.**,
Gyeonggi-do (KR)(21) Appl. No.: **12/765,392**(22) Filed: **Apr. 22, 2010**(30) **Foreign Application Priority Data**

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US 20100271283A1

(19) **United States**(12) **Patent Application Publication**
SUNG et al.(10) **Pub. No.: US 2010/0271283 A1**(43) **Pub. Date: Oct. 28, 2010**(54) **ANTENNA PATTERN FRAME AND METHOD
OF MANUFACTURING THE SAME****Publication Classification**

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(51) **Int. Cl.**
H01Q 1/36 (2006.01)
H01Q 1/50 (2006.01)
H01P 11/00 (2006.01)

(52) **U.S. Cl.** **343/906**; 343/700 MS; 29/601;
343/702

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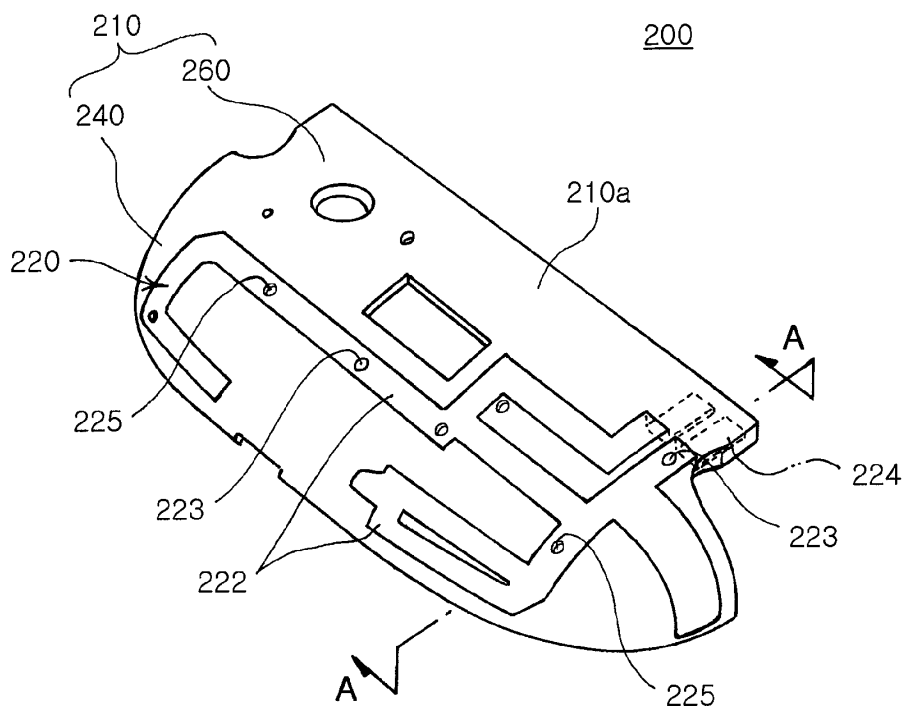
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(21) Appl. No.: **12/645,992**(22) Filed: **Dec. 23, 2009**(30) **Foreign Application Priority Data**

Apr. 23, 2009 (KR) 10-2009-0035636

(57) **ABSTRACT**

An antenna pattern frame according to an aspect of the invention may include: a radiator having an antenna pattern portion transmitting and receiving a signal and a connection terminal portion allowing the signal to be transmitted to and received from a circuit board of an electronic device; a connection portion partially forming the radiator and connecting the antenna pattern portion and the connection terminal portion to be arranged in different planes; a radiator frame manufactured by injection molding on the radiator so that the antenna pattern portion may be provided on one side of the radiator frame and the connection terminal portion may be provided on the other side thereof, while the antenna pattern portion is embedded in the electronic device case; and a contact surface extension provided on the radiator to prevent the radiator from being loosened from the radiator frame during injection molding of the radiator frame, and increasing a contact area with respect to the radiator frame.



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