



US 20150116158A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0116158 A1**

(43) **Pub. Date: Apr. 30, 2015**

(54) **ANTENNA FOR MOBILE DEVICE HAVING METALLIC SURFACE**

(22) Filed: **Oct. 28, 2013**

Publication Classification

(71) Applicants: **Osama Nafeth ALRABADI**, Aalborg (DK); **Alexandru Daniel TATOMIRESCU**, Aalborg (DK); **Mikael Bergholz KNUDSEN**, Gistrup (DK); **Gert F. PEDERSEN**, Storvorde (DK); **Poul OLESEN**, Stovring (DK); **Peter BUNDGAARD**, Aalborg (DK)

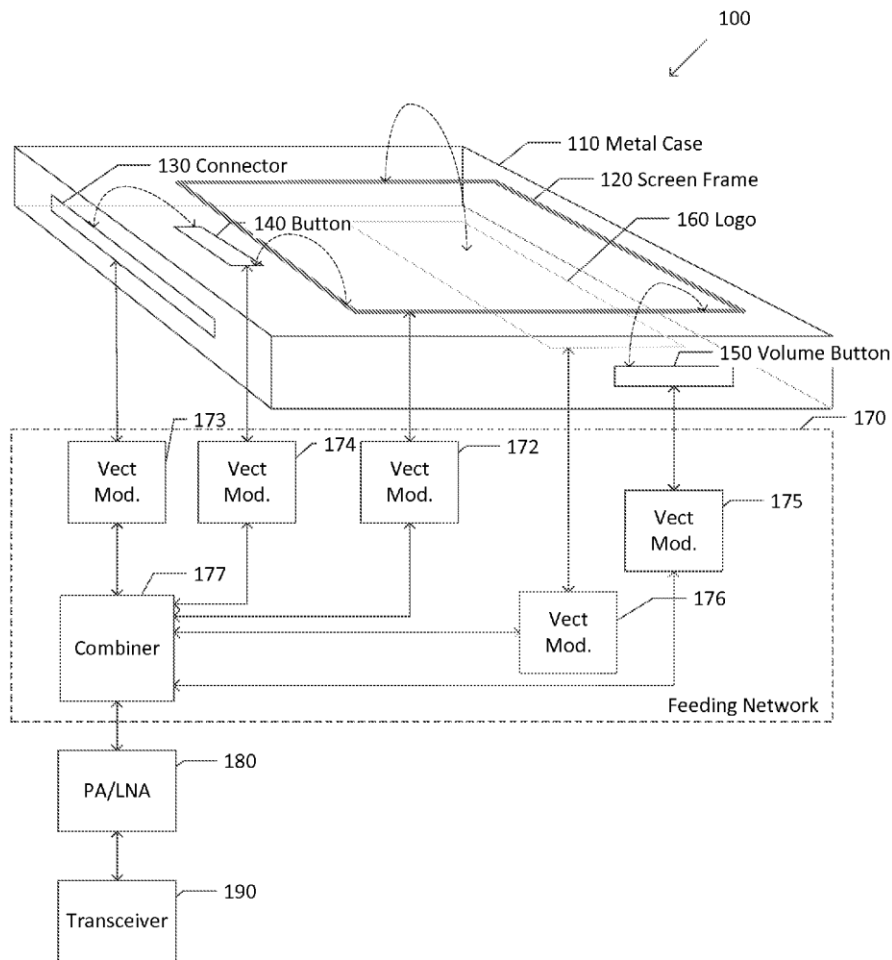
(51) **Int. Cl.**
H01Q 13/10 (2006.01)
(52) **U.S. Cl.**
CPC **H01Q 13/106** (2013.01)

(57) **ABSTRACT**

An antenna having a plurality of ports coupled to at least one radiator opening or protuberance formed on a metallic surface. A plurality of modulators are coupled to the plurality of respective ports and configured to modulate phase or amplitude of a plurality of signals radiated at the plurality of respective ports. A combiner is configured to combine the modulated signals to substantially cancel power reflected from the plurality of respective ports, wherein the plurality of respective ports are functionally aggregated into a single port.

(72) Inventors: **Osama Nafeth ALRABADI**, Aalborg (DK); **Alexandru Daniel TATOMIRESCU**, Aalborg (DK); **Mikael Bergholz KNUDSEN**, Gistrup (DK); **Gert F. PEDERSEN**, Storvorde (DK); **Poul OLESEN**, Stovring (DK); **Peter BUNDGAARD**, Aalborg (DK)

(21) Appl. No.: **14/064,800**





US 20150116167A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0116167 A1**

(43) **Pub. Date: Apr. 30, 2015**

(54) **ANTENNA APPARATUS**

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

CPC *H01Q 5/0037* (2013.01)

(71) Applicant: **HiDeep Inc.**, Gyeonggi-do (KR)

(72) Inventors: **Bumkyum KIM**, Gyeonggi-do (KR);
Taeyeop LEE, Gyeonggi-do (KR);
Youngho CHO, Gyeonggi-do (KR);
Bonkee KIM, Gyeonggi-do (KR)

(57) **ABSTRACT**

An antenna apparatus may be provided that includes: a radiating metal; a ground which is connected to the radiating metal; a first impedance which forms a first path by being connected between the radiating metal and the ground, has an impedance value which is changed depending on a frequency, and opens the first path in response to a predetermined frequency, and a second impedance which forms a second path parallel with the first path by being connected between the radiating metal and the ground, has an impedance value which is changed depending on a frequency, and short-circuits the second path in response to the predetermined frequency.

(21) Appl. No.: **14/524,735**

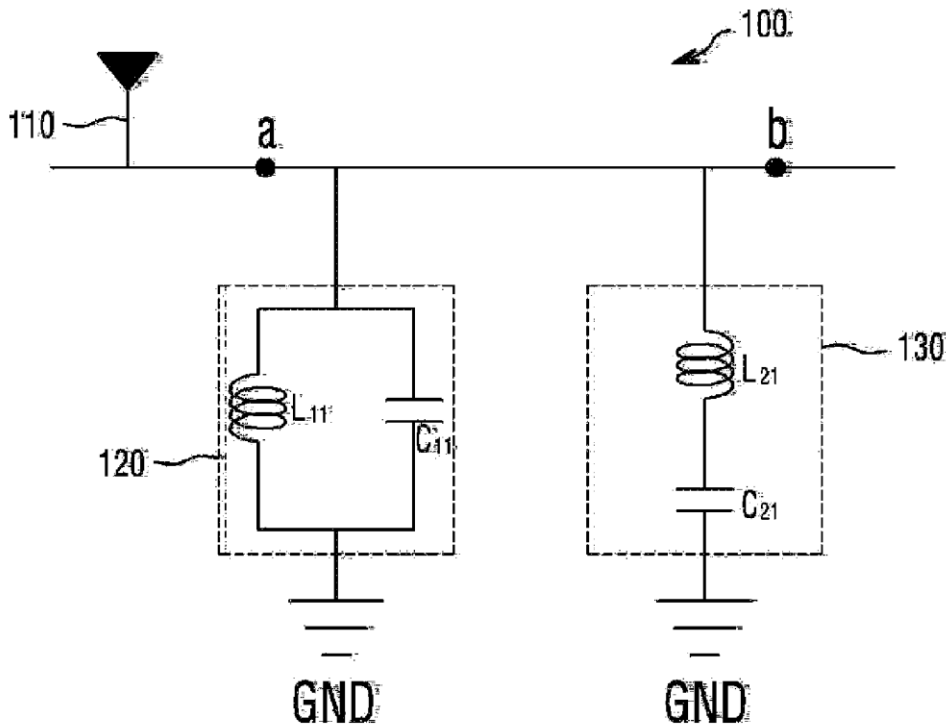
(22) Filed: **Oct. 27, 2014**

(30) **Foreign Application Priority Data**

Oct. 28, 2013 (KR) 10-2013-0128212

Publication Classification

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





US 20150116168A1

(19) **United States**

(12) **Patent Application Publication**
YOSUI

(10) **Pub. No.: US 2015/0116168 A1**

(43) **Pub. Date: Apr. 30, 2015**

(54) **ANTENNA DEVICE AND ELECTRONIC APPARATUS**

Publication Classification

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

(51) **Int. Cl.**
H01Q 5/328 (2006.01)
H01Q 7/00 (2006.01)

(72) Inventor: **Kuniaki YOSUI**, Nagaokakyo-shi (JP)

(52) **U.S. Cl.**
CPC . *H01Q 5/328* (2015.01); *H01Q 7/00* (2013.01)

(21) Appl. No.: **14/591,038**

(57) **ABSTRACT**

(22) Filed: **Jan. 7, 2015**

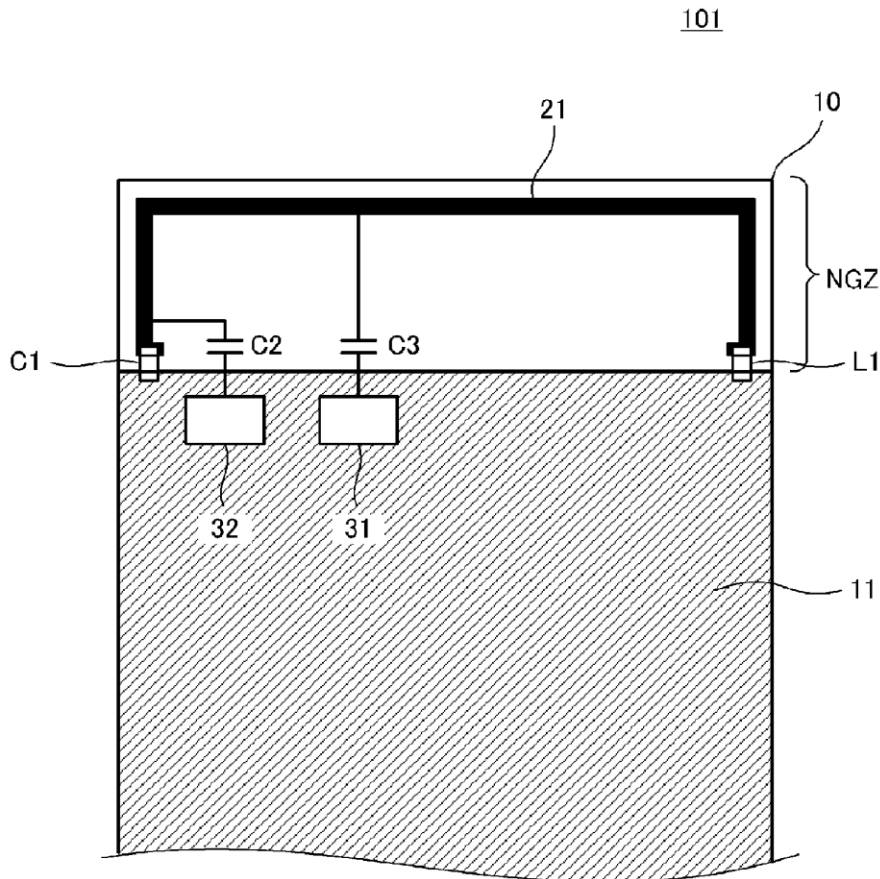
A square bracket-shaped radiation element is in a non-ground region of a board. A first reactance element that equivalently enters a short-circuited state in a second frequency band is connected between a second end of the radiation element and a ground conductor. A second reactance element that equivalently enters a short-circuited state in a first frequency band is connected between a first end of the radiation element and the ground conductor. In the UHF band, the radiation element and the ground conductor function as an inverted F antenna that contributes to field emission. In the HF band, a loop including the radiation element and the ground conductor functions as a loop antenna that contributes to magnetic field emission.

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2013/083601, filed on Dec. 16, 2013.

Foreign Application Priority Data

(30) Dec. 21, 2012 (JP) 2012-280243





US 20150116169A1

(19) **United States**

(12) **Patent Application Publication**
Ying

(10) **Pub. No.: US 2015/0116169 A1**

(43) **Pub. Date: Apr. 30, 2015**

(54) **MM WAVE ANTENNA ARRAY INTEGRATED WITH CELLULAR ANTENNA**

Publication Classification

(71) Applicant: **Sony Corporation**, Tokyo (JP)

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

(72) Inventor: **Zhinong Ying**, Lund (SE)

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

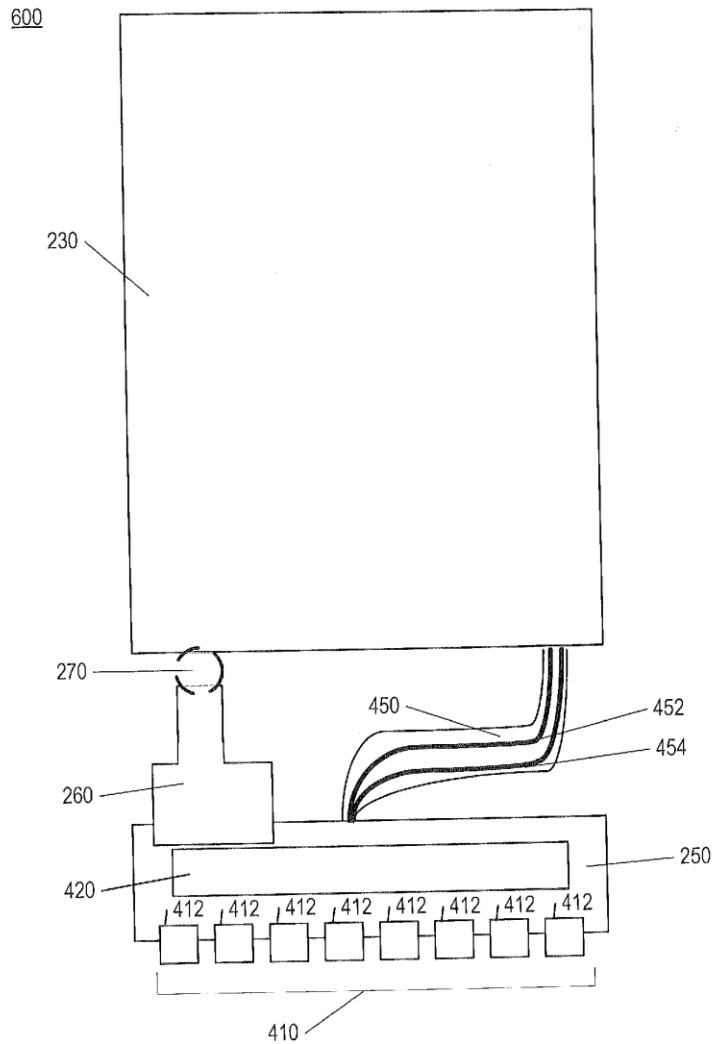
(73) Assignee: **Sony Corporation**, Tokyo (JP)

(57) **ABSTRACT**

(21) Appl. No.: **14/068,381**

Wireless electronic devices may include a millimeter Wave (mmW) antenna array integrated with a cellular antenna. The devices may also include a package or module on the cellular antenna that integrates the mmW antenna array and an mmW circuit. The devices may also include a grounding element that includes an mmW antenna control and a power trace.

(22) Filed: **Oct. 31, 2013**





US 20150116179A1

(19) **United States**

(12) **Patent Application Publication**
Mikata

(10) **Pub. No.: US 2015/0116179 A1**

(43) **Pub. Date: Apr. 30, 2015**

(54) **CHIP ANTENNA AND COMMUNICATION
CIRCUIT SUBSTRATE FOR TRANSMISSION
AND RECEPTION**

(71) Applicant: **TAIYO YUDEN CO., LTD.**, Tokyo (JP)

(72) Inventor: **Jin Mikata**, Tokyo (JP)

(73) Assignee: **TAIYO YUDEN CO., LTD.**, Tokyo (JP)

(21) Appl. No.: **14/486,727**

(22) Filed: **Sep. 15, 2014**

(30) **Foreign Application Priority Data**

Oct. 30, 2013 (JP) 2013-224955

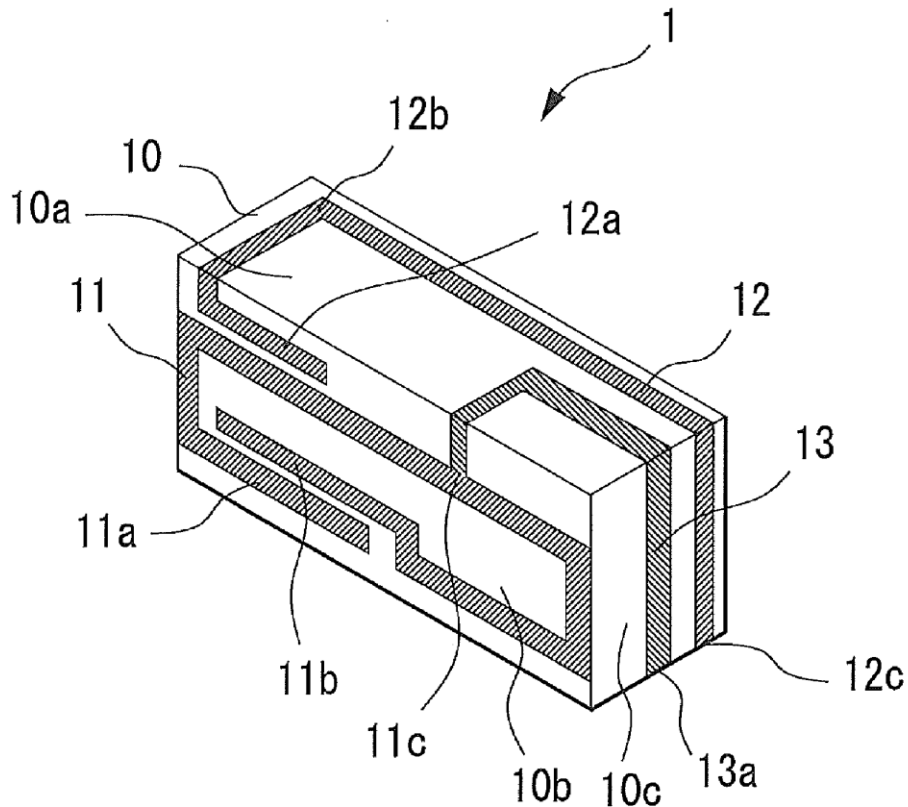
Publication Classification

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

(52) **U.S. Cl.**
CPC **H01Q 5/0065** (2013.01); **H01Q 9/0457**
(2013.01)

(57) **ABSTRACT**

A first radiating electrode of a split ring resonator type is formed on a side face of a substrate of a rectangular cuboid antenna device so as to be at a right angle to a ground electrode surface, a second radiating electrode is provided on a top surface of the substrate, the first radiating electrode and the second radiating electrode are capacitively coupled, and the resonance frequency of the first radiating electrode and second radiating electrode are configured to be approximately in symmetry with the central frequency of the used frequency.





US 20150116183A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0116183 A1**

(43) **Pub. Date: Apr. 30, 2015**

(54) **SELF-CONFIGURABLE RESONANCE ANTENNA**

(30) **Foreign Application Priority Data**

Oct. 28, 2013 (CN) 201310518179.5

(71) Applicants: **Roger Tay**, Singapore (SG); **Ng Guan Hong**, Singapore (SG); **Bong Jun San**, Singapore (SG); **Tan Yew Choon**, Singapore (SG); **Chan Yun Ghit**, Singapore (SG); **Karen Goh Hui Leng**, Singapore (SG)

Publication Classification

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

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

(72) Inventors: **Roger Tay**, Singapore (SG); **Ng Guan Hong**, Singapore (SG); **Bong Jun San**, Singapore (SG); **Tan Yew Choon**, Singapore (SG); **Chan Yun Ghit**, Singapore (SG); **Karen Goh Hui Leng**, Singapore (SG)

(57) **ABSTRACT**

A self-configurable resonance antenna includes a main antenna for transmitting and receiving radio waves of a plurality of mutually different frequency bands, a coupling element having at least two radiating patches with different effective electrical lengths for configuring the impedance of the self-configurable resonance antenna, and a matching circuit disposed between the main antenna and the coupling element. The matching circuit has a filter, a RF detector, a switching logic and a RF switch, the RF switch switching between at least the two radiating patches with different effective electrical lengths for adjusting the main antenna operating in different frequency bands.

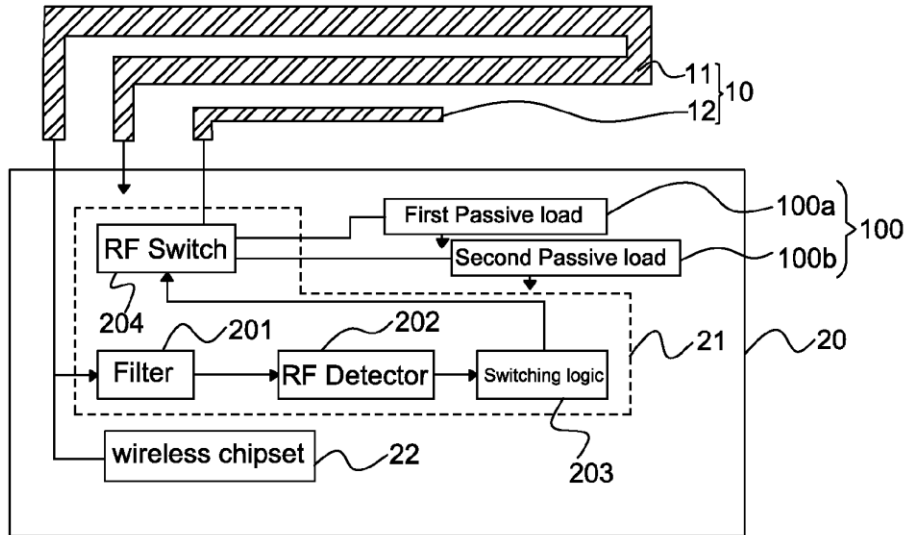
(73) Assignee: **AAC TECHNOLOGIES PTE. LTD.**, Singapore (SG)

(21) Appl. No.: **14/524,071**

(22) Filed: **Oct. 27, 2014**

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US 20150117502A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0117502 A1**

(43) **Pub. Date: Apr. 30, 2015**

(54) **ANTENNA STRUCTURES AND METHODS**

H04B 7/04 (2006.01)

H01Q 13/10 (2006.01)

(71) Applicant: **Skycross, Inc.**, San Jose, CA (US)

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

(72) Inventors: **Li Chen**, Melbourne, FL (US); **Frank M. Caimi**, Vero Beach, FL (US); **Mark T. Montgomery**, Melbourne Beach, FL (US); **Mark W. Kishler**, Rockledge, FL (US)

CPC **H01Q 1/243** (2013.01); **H01Q 13/10** (2013.01); **H04B 1/38** (2013.01); **H04B 7/0404** (2013.01)

(21) Appl. No.: **14/449,498**

(57) **ABSTRACT**

(22) Filed: **Aug. 1, 2014**

Related U.S. Application Data

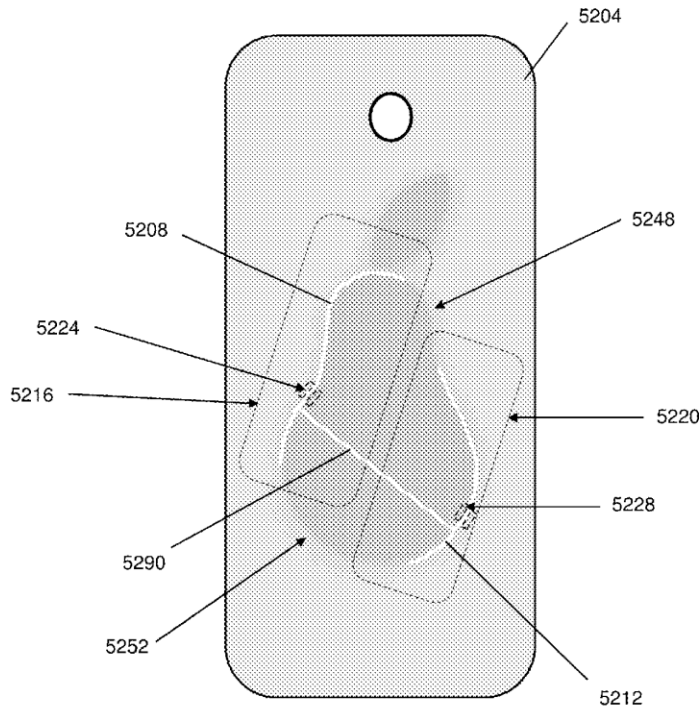
(60) Provisional application No. 61/896,233, filed on Oct. 28, 2013, provisional application No. 61/932,831, filed on Jan. 29, 2014, provisional application No. 61/941,888, filed on Feb. 19, 2014.

A communication device that incorporates the subject disclosure may include, for example, a conductive cover, an antenna structure, and a circuit. The antenna structure can comprise a first portion of the conductive cover having a first slot formed therein. The first portion can form a first antenna element for converting between first electromagnetic signals and first electrical signals. The first slot can define a shape of a trade dress design in the conductive cover. The circuit can be communicatively coupled to first edges of the first slot to define a first port. The circuit can perform operations comprising transmitting the first electronic signals into the first antenna element. Other embodiments are disclosed.

Publication Classification

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H04B 1/38 (2006.01)

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US 20150123855A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0123855 A1**

(43) **Pub. Date: May 7, 2015**

(54) **ANTENNA AND COMMUNICATION DEVICE
COMPRISING SAME**

Publication Classification

(71) Applicant: **EMW CO., LTD.**, Incheon (KR)
(72) Inventors: **Byung Hoon Ryu**, Seoul (KR); **Won Mo Sung**, Gyeonggi-do (KR); **Ui Sheon Kim**, Gyeonggi-do (KR); **Yeon Sik Yu**, Gyeonggi-do (KR)
(73) Assignee: **EMW CO., LTD.**, Incheon (KR)

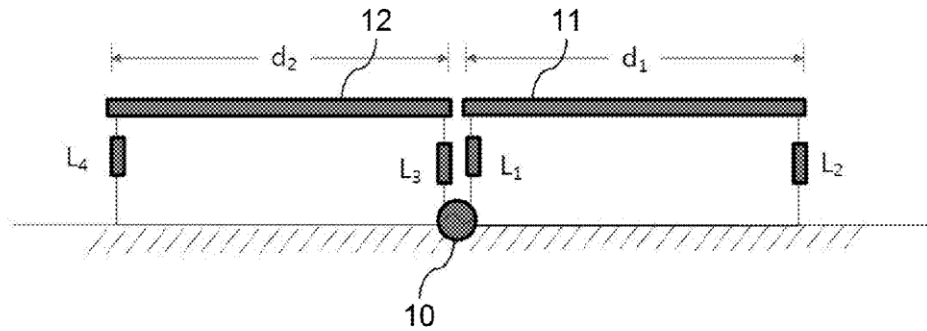
(51) **Int. Cl.**
H01Q 7/00 (2006.01)
H01Q 1/24 (2006.01)
H01Q 1/48 (2006.01)
(52) **U.S. Cl.**
CPC . **H01Q 7/00** (2013.01); **H01Q 1/48** (2013.01);
H01Q 1/24 (2013.01)

(21) Appl. No.: **14/404,941**
(22) PCT Filed: **May 31, 2013**
(86) PCT No.: **PCT/KR2013/004743**
§ 371 (c)(1),
(2) Date: **Dec. 1, 2014**

(57) **ABSTRACT**

Disclosed are an antenna and a communication device including the same. The antenna includes a feeder, a first loop antenna that has an end connected to the feeder and the other end connected to a ground, and a second loop antenna that has an end connected to the feeder and the other end connected to the ground, and has an electrical length different from that of the first loop antenna, wherein an impedance matching line having a discontinuously different line width is formed in a partial area of the first loop antenna.

(30) **Foreign Application Priority Data**
Jun. 1, 2012 (KR) 10-2012-0059243





US 20150123856A1

(19) **United States**

(12) **Patent Application Publication**
Qiu

(10) **Pub. No.: US 2015/0123856 A1**

(43) **Pub. Date: May 7, 2015**

(54) **ANTENNA AND TERMINAL DEVICE**

Publication Classification

(71) Applicant: **ZTE CORPORATION**, Shenzhen City,
Guangdong (CN)

(51) **Int. Cl.**
H01Q 1/24 (2006.01)
H01Q 21/00 (2006.01)
H01Q 21/30 (2006.01)

(72) Inventor: **Zhi Qiu**, Shenzhen City (CN)

(52) **U.S. Cl.**
CPC **H01Q 1/243** (2013.01); **H01Q 21/30**
(2013.01); **H01Q 21/0006** (2013.01)

(21) Appl. No.: **14/413,467**

(57) **ABSTRACT**

(22) PCT Filed: **Jun. 26, 2013**

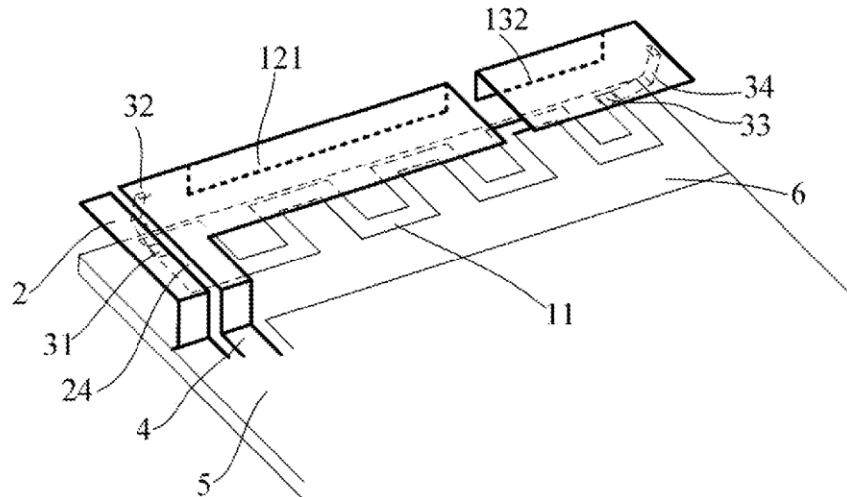
An antenna and a terminal device include a Printed Circuit Board (PCB), a first main antenna, a second main antenna and a connection component. The first main antenna is printed on the PCB, and the second main antenna is configured outside the PCB and electrically connected to the first main antenna through the connection component. By connecting the antenna printed on the PCB with the antenna configured outside the PCB, the limitation that wiring space is not enough in the existing antenna design is made up, and the utilization of the limited space can be significantly improved when the wiring of the antenna is designed.

(86) PCT No.: **PCT/CN2013/078046**

§ 371 (c)(1),
(2) Date: **Jan. 8, 2015**

(30) **Foreign Application Priority Data**

Jul. 11, 2012 (CN) 201210239042.1





US 20150123857A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0123857 A1**

(43) **Pub. Date: May 7, 2015**

(54) **ELECTRONIC APPARATUS INCLUDING ANTENNA DEVICE**

(52) **U.S. Cl.**
CPC **H01Q 1/2266** (2013.01); **H01Q 1/243** (2013.01); **H01Q 21/30** (2013.01)

(71) Applicant: **Samsung Electronics Co., Ltd.**,
Gyeonggi-do (KR)

(72) Inventors: **Hoon PARK**, Seoul (KR); **Yeon-Woo KIM**, Seoul (KR); **Ho-Saeng KIM**,
Gyeonggi-do (KR)

(57) **ABSTRACT**

An electronic apparatus is provided. The electronic apparatus includes at least one first antenna radiator, a main board including a feed part that is spaced apart from at least one portion of the at least one first antenna radiator to overlap the at least one portion of the at least one first antenna radiator and feeds an electric current to the at least one first antenna radiator according to an indirect feed method, at least one second antenna radiator disposed on a housing of the electronic apparatus, at least one first connection member for electrically connecting the at least one first antenna radiator to the at least one second antenna radiator, and at least one second connection member for electrically connecting a ground part formed on the main board to the at least one second antenna radiator. Also, other various exemplary may be implemented.

(21) Appl. No.: **14/532,235**

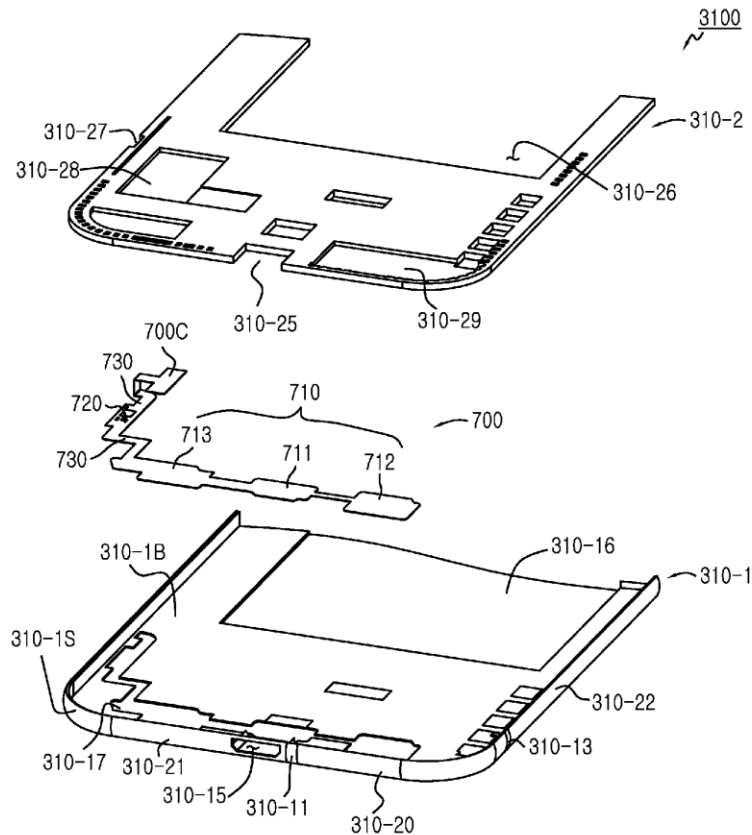
(22) Filed: **Nov. 4, 2014**

(30) **Foreign Application Priority Data**

Nov. 4, 2013 (KR) 10-2013-0133221

Publication Classification

(51) **Int. Cl.**
H01Q 1/22 (2006.01)
H01Q 21/30 (2006.01)
H01Q 1/24 (2006.01)





US 20150123859A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0123859 A1**

(43) **Pub. Date: May 7, 2015**

(54) **MOBILE TERMINAL**

Publication Classification

(71) Applicants: **SONY CORPORATION**, Tokyo (JP);
SONY MOBILE COMMUNICATIONS, INC., Tokyo (JP)

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

(72) Inventors: **Kenichiro KODAMA**, Tokyo (JP); **Aiko Yoshida**, Tokyo (JP); **Akihiro Bungo**, Tokyo (JP)

(52) **U.S. Cl.**
CPC **H01Q 21/0006** (2013.01); **H01Q 1/243** (2013.01)

(73) Assignees: **SONY CORPORATION**, Tokyo (JP);
SONY MOBILE COMMUNICATIONS, INC., Tokyo (JP)

(57) **ABSTRACT**

(21) Appl. No.: **14/594,574**

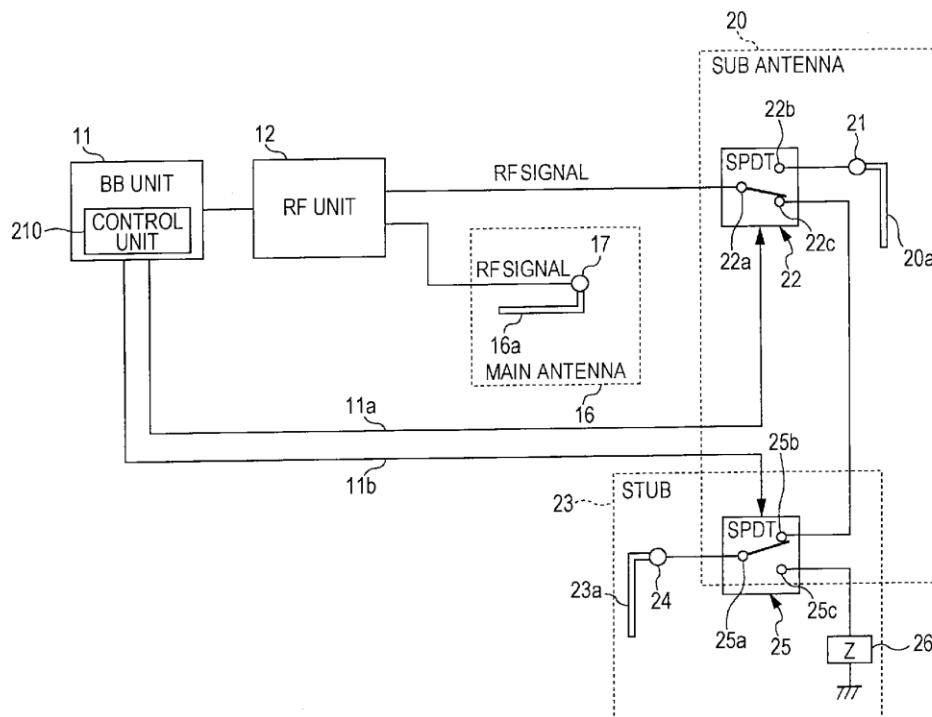
A mobile terminal that includes a first antenna element disposed in proximity to a first side of the mobile terminal, a second antenna element disposed in proximity to a second side of the mobile terminal, and a third antenna element disposed in proximity to a third side of the mobile terminal. The mobile terminal further including a switching mechanism that switches between a first connection mode in which the first and second antenna elements are feed elements and the third antenna element is a parasitic element, and a second connection mode in which the first and third antenna elements are feed elements, and a control unit that controls the switching mechanism to switch between the first connection mode and the second connection mode in accordance with a predetermined condition.

(22) Filed: **Jan. 12, 2015**

Related U.S. Application Data

(62) Division of application No. 13/544,418, filed on Jul. 9, 2012.

(60) Provisional application No. 61/524,916, filed on Aug. 18, 2011.





US 20150123861A1

(19) **United States**

(12) **Patent Application Publication**
Lo Hine Tong et al.

(10) **Pub. No.: US 2015/0123861 A1**

(43) **Pub. Date: May 7, 2015**

(54) **METHOD FOR CREATING A SLOT-LINE ON A MULTILAYER SUBSTRATE AND MULTILAYER PRINTED CIRCUIT COMPRISING AT LEAST ONE SLOT-LINE REALIZED ACCORDING TO SAID METHOD AND USED AS AN ISOLATING SLOT OR ANTENNA**

Publication Classification

(51) **Int. Cl.**
H01Q 13/10 (2006.01)
H05K 3/22 (2006.01)
H05K 1/02 (2006.01)
(52) **U.S. Cl.**
CPC *H01Q 13/106* (2013.01); *H05K 1/0298* (2013.01); *H05K 3/22* (2013.01)

(71) Applicant: **THOMASON LICENSING**, Issy de Moulineaux (FR)

(57) **ABSTRACT**

(72) Inventors: **Dominique Lo Hine Tong**, Rennes (FR); **Philippe Minard**, Saint Medard Sur Ille (FR); **Jean-Luc Robert**, Betton (FR)

The present invention relates to a method for realizing a short-circuited slot-line on a multilayer substrate comprising at least a first conductive layer, a dielectric layer and a second conductive layer, the method comprising the following steps: etching in the first conductive layer a slot-line (2) having an electrical length L, etching in the first conductive layer, around the slot-line, a first portion of a first band having an electrical length $L1 \leq L$, etching in the first conductive layer, around the slot-line, a second portion of said first band, having an electrical length $L2 \leq L$, etching in the second conductive layer, a second band in the form of a loop having an electrical length L3, one end of the second band being connected to the first part of the first band and the other end of the second band being connected to the second part of the first band so as to form a conductive loop.

(21) Appl. No.: **14/400,382**

(22) PCT Filed: **May 6, 2013**

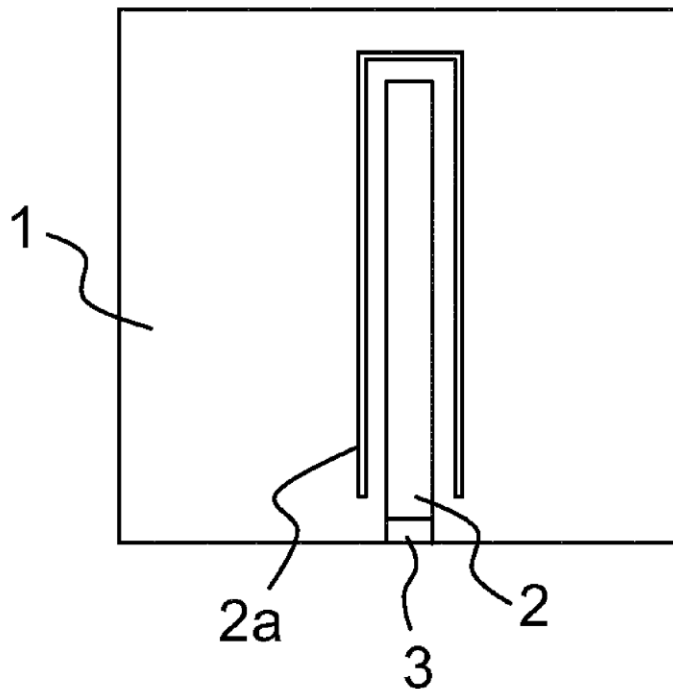
(86) PCT No.: **PCT/EP2013/059394**

§ 371 (c)(1),
(2) Date: **Nov. 11, 2014**

(30) **Foreign Application Priority Data**

May 14, 2012 (FR) 1254368

The method is used notably to realize isolating slot-lines and slot-antennae.





US 20150123866A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0123866 A1**

(43) **Pub. Date: May 7, 2015**

(54) **ANTENNA WITH HIGH ISOLATION**

Publication Classification

(71) Applicant: **FOXCONN INTERCONNECT TECHNOLOGY LIMITED**, Grand Cayman (KY)

(51) **Int. Cl.**
H01Q 1/52 (2006.01)
H01Q 5/00 (2006.01)

(72) Inventors: **TZU-YAO HWANG**, New Taipei (TW);
LUNG-SHENG TAI, New Taipei (TW)

(52) **U.S. Cl.**
CPC **H01Q 1/526** (2013.01); **H01Q 5/0027** (2013.01)

(21) Appl. No.: **14/522,603**

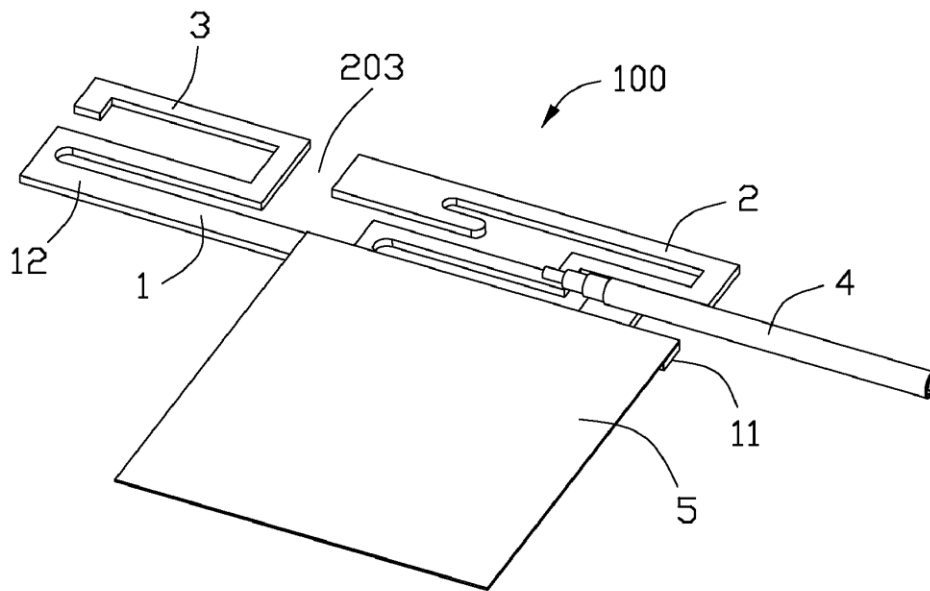
(57) **ABSTRACT**

(22) Filed: **Oct. 24, 2014**

An antenna includes a grounding portion extending in a longitudinal direction, a main body and an isolating portion extending from the grounding portion, a metal foil assembled on the grounding portion and a coaxial cable connecting the main body. The grounding portion includes a first section and a second section connecting with each other. The main body extends from the first section while the isolating portion extends from the second section. The isolating portion locates beside the main body in the longitudinal direction and defines a gap therebetween.

(30) **Foreign Application Priority Data**

Nov. 6, 2013 (TW) 102140199





US 20150123871A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0123871 A1**

(43) **Pub. Date: May 7, 2015**

(54) **MOBILE DEVICE AND ANTENNA STRUCTURE WITH CONDUCTIVE FRAME**

(52) **U.S. CL.**
CPC **H01Q 1/24** (2013.01)

(71) Applicant: **Acer Incorporated**, New Taipei City (TW)

(57) **ABSTRACT**

(72) Inventors: **Chih-Hua Chang**, New Taipei City (TW); **Shao-Yu Huang**, New Taipei City (TW); **Hsien-Chang Lin**, New Taipei City (TW)

A mobile device includes a dielectric substrate, a ground element, a signal source, a first conductive frame, a second conductive frame, a third conductive frame, a shorting element, a feeding element, a first radiation element, and a second radiation element. The first conductive frame, the second conductive frame, and the third conductive frame are separate from each other. The second conductive frame is coupled through the shorting element to the ground element. The first radiation element is coupled to the feeding element. An open end of the first radiation element is adjacent to the second conductive frame. The second radiation element is coupled to the feeding element. An open end of the second radiation element is adjacent to the third conductive frame. An antenna structure is formed by the feeding element, the first radiation element, the second radiation element, the shorting element, and the second conductive frame.

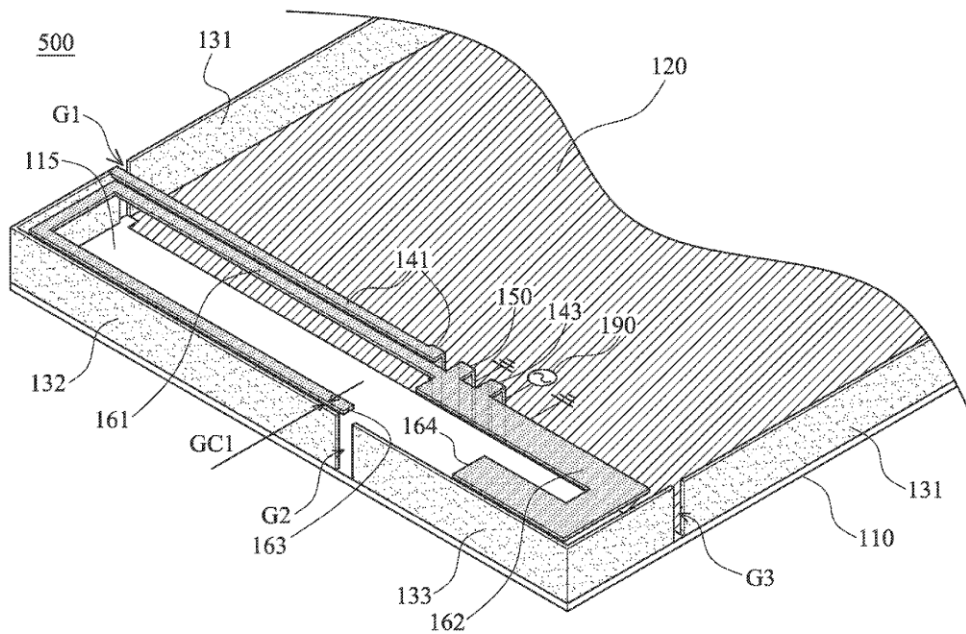
(73) Assignee: **Acer Incorporated**, New Taipei City (TW)

(21) Appl. No.: **14/073,097**

(22) Filed: **Nov. 6, 2013**

Publication Classification

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





US 20150123874A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0123874 A1**

(43) **Pub. Date: May 7, 2015**

(54) **WIDEBAND ANTENNA STRUCTURE**

Publication Classification

(71) Applicant: **Quanta Computer Inc.**, Kuei Shan Hsiang (TW)

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

(72) Inventors: **Ming-Che Chan**, Kuei Shan Hsiang (TW); **Chun-I Lin**, Kuei Shan Hsiang (TW); **Hui Lin**, Kuei Shan Hsiang (TW)

(52) **U.S. Cl.**
CPC **H01Q 5/0093** (2013.01); **H01Q 5/0027** (2013.01)

(73) Assignee: **Quanta Computer Inc.**, Kuei Shan Hsiang (TW)

(57) **ABSTRACT**

(21) Appl. No.: **14/181,014**

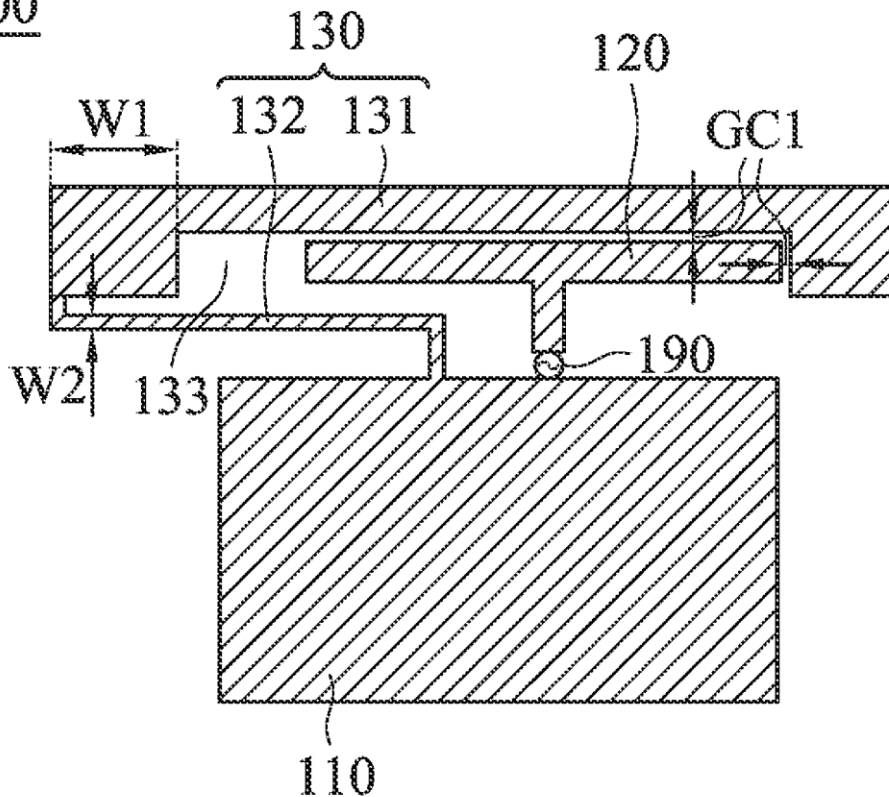
An antenna structure includes a ground plane, a feeding element, and a coupling radiation element. The feeding element is coupled to a signal source. The feeding element substantially has a T-shape. The coupling radiation element is separate from the feeding element and is adjacent to the feeding element. The coupling radiation element is further coupled to the ground plane and at least partially surrounds the feeding element.

(22) Filed: **Feb. 14, 2014**

(30) **Foreign Application Priority Data**

Nov. 4, 2013 (TW) 102139900

100





US 20150130669A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0130669 A1**

(43) **Pub. Date: May 14, 2015**

(54) **ANTENNA DEVICE AND WIRELESS APPARATUS INCLUDING SAME**

(30) **Foreign Application Priority Data**

Jul. 20, 2012 (JP) 2012-161983

(71) Applicant: **Asahi Glass Company, Limited,**
Chiyoda-ku (JP)

Publication Classification

(72) Inventors: **Ryuta SONODA,** Chiyoda-ku (JP); **Koji IKAWA,** Chiyoda-ku (JP); **Toshiki SAYAMA,** Chiyoda-ku (JP)

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

(73) Assignee: **Asahi Glass Company, Limited,**
Chiyoda-ku (JP)

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

(21) Appl. No.: **14/600,163**

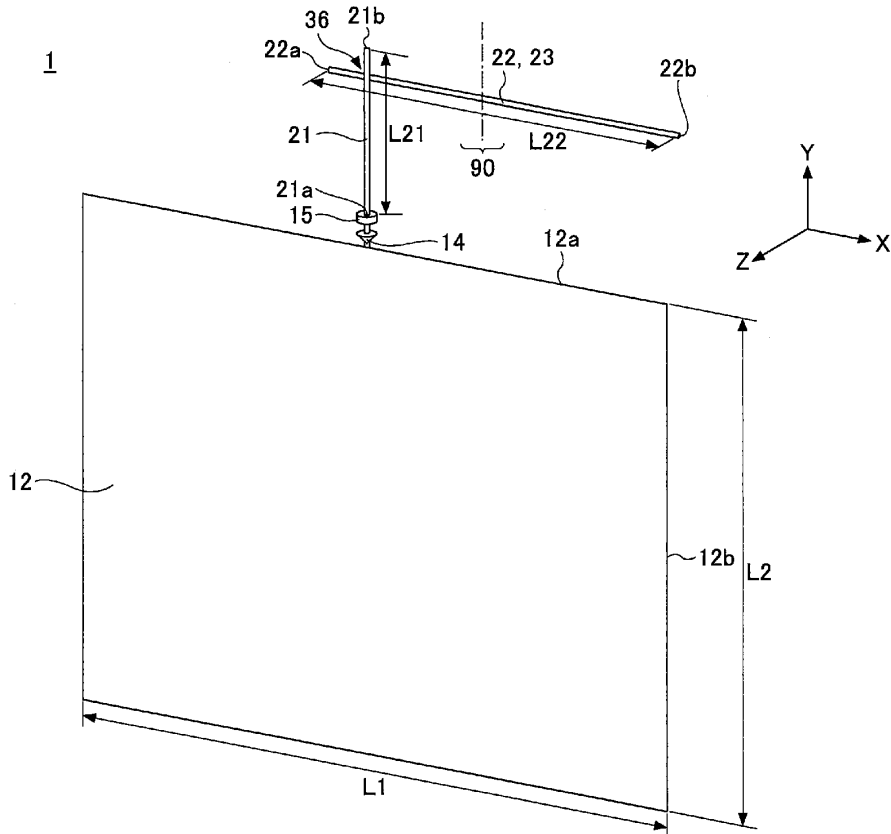
(57) **ABSTRACT**

(22) Filed: **Jan. 20, 2015**

An antenna device includes a feeding element connected to a feed point, and a radiating element disposed at a distance from the feeding element. The feeding element is coupled with the radiating element by electromagnetic field coupling to feed the radiating element so that the radiating element functions as a radiating conductor.

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2013/067135, filed on Jun. 21, 2013.





US 20150130670A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0130670 A1**

(43) **Pub. Date: May 14, 2015**

(54) **ANTENNA DEVICE OF A MOBILE TERMINAL**

(30) **Foreign Application Priority Data**

Aug. 22, 2011 (KR) 10-2011-0083212

(71) Applicant: **Samsung Electronics Co., Ltd.**,
Suwon-si (KR)

Publication Classification

(72) Inventors: **Young Boo VIN**, Hwasung-si (KR);
Dong Hyun LEE, Suwon-si (KR); **Soon Ho HWANG**, Seoul (KR); **Hae Yeon KIM**, Suwon-si (KR); **Bum Jin CHO**, Hwasung-si (KR); **Se Hyun PARK**, Suwon-si (KR); **Joon Ho BYUN**, Seongnam-si (KR)

(51) **Int. Cl.**
H01Q 19/00 (2006.01)
H01Q 1/24 (2006.01)

(52) **U.S. Cl.**
CPC **H01Q 19/005** (2013.01); **H01Q 1/243** (2013.01)

(21) Appl. No.: **14/603,653**

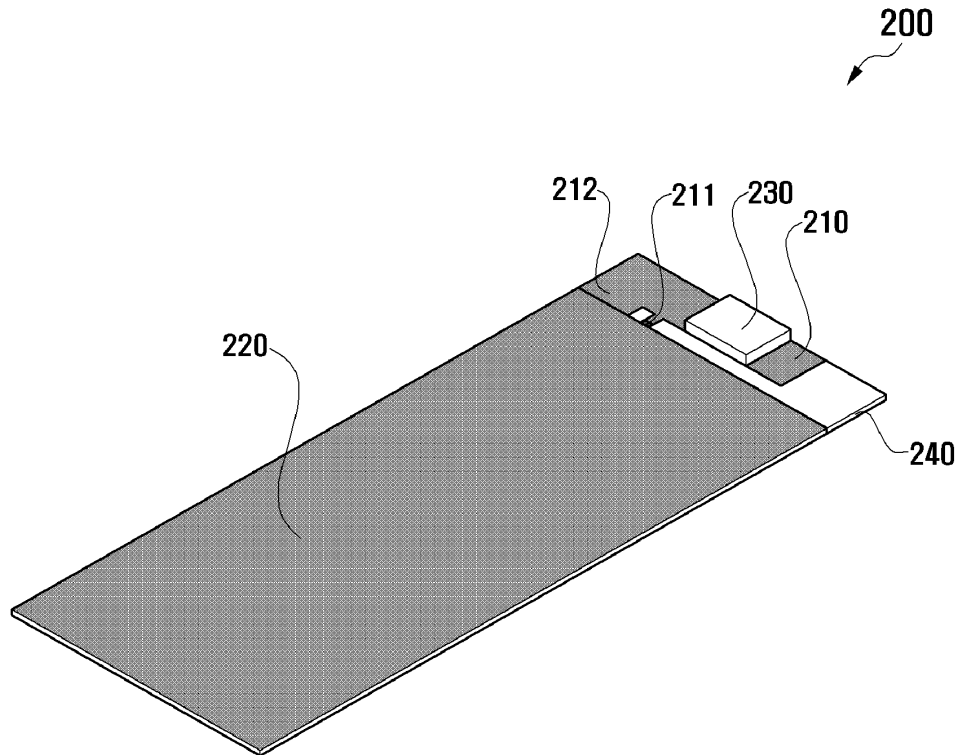
(57) **ABSTRACT**

(22) Filed: **Jan. 23, 2015**

An antenna device of a mobile terminal having improved performance by utilizing a metal object located in proximity to the antenna device as an antenna radiator is provided. The antenna device includes an antenna pattern connected to a feeder and a ground line, and a metal component positioned on the antenna pattern and including a metal that forms an antenna radiator.

Related U.S. Application Data

(63) Continuation of application No. 13/343,863, filed on Jan. 5, 2012, now Pat. No. 8,963,783.





US 20150130676A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0130676 A1**

(43) **Pub. Date: May 14, 2015**

(54) **MULTI-FREQUENCY ANTENNA**

Publication Classification

(71) Applicant: **UNICTRON TECHNOLOGIES CORP.**, Hsin-Chu (TW)

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

(72) Inventors: **Chih-Shen Chou**, Miaoli County (TW);
Tsung-Shou Yeh, Hsin-Chu (TW);
Shih-Chun Huang, Taoyuan County (TW);
Hsiang-Cheng Yang, Taoyuan County (TW)

(52) **U.S. Cl.**
CPC **H01Q 21/30** (2013.01)

(57) **ABSTRACT**

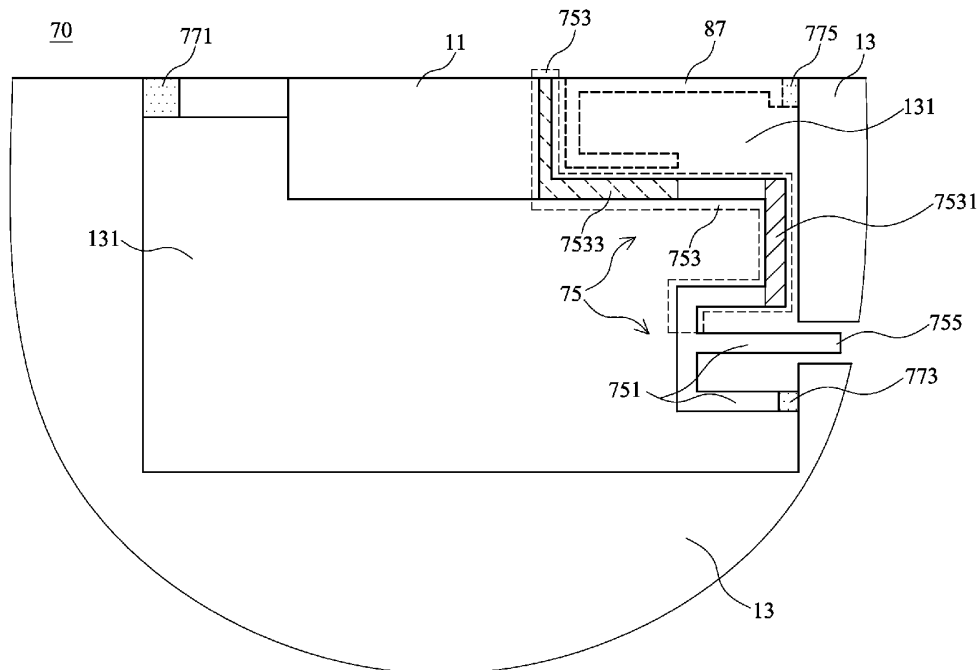
A multi-frequency antenna includes a ground layer, at least one antenna unit and at least one antenna network. The antenna unit has its one end electrically connected to the ground layer and its other end electrically connected to the antenna network for generating at least one first resonance frequencies. The antenna network includes at least one feeding circuit, and at least one resonance unit. Each resonance unit includes at least one resonant segment. Each resonant segment is electromagnetically coupled with the adjacent ground layer to generate at least one second resonance frequency. Thus, the multi-frequency antenna is capable of generating multiple different resonance frequencies.

(21) Appl. No.: **14/513,222**

(22) Filed: **Oct. 14, 2014**

(30) **Foreign Application Priority Data**

Nov. 14, 2013 (TW) 102221344





US 20150138024A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0138024 A1**

(43) **Pub. Date: May 21, 2015**

(54) **DEPOSITED THREE-DIMENSIONAL ANTENNA APPARATUS AND METHODS**

(52) **U.S. Cl.**
CPC **H01Q 1/243** (2013.01)

(71) Applicant: **Pulse Finland OY**, Kempele (FI)

(72) Inventors: **ESA Kalistaja**, Oulu (FI); **Riku Lambacka**, Oulu (FI); **Petteri Annamaa**, Oulunsalo (FI)

(57) **ABSTRACT**

(21) Appl. No.: **14/491,684**

(22) Filed: **Sep. 19, 2014**

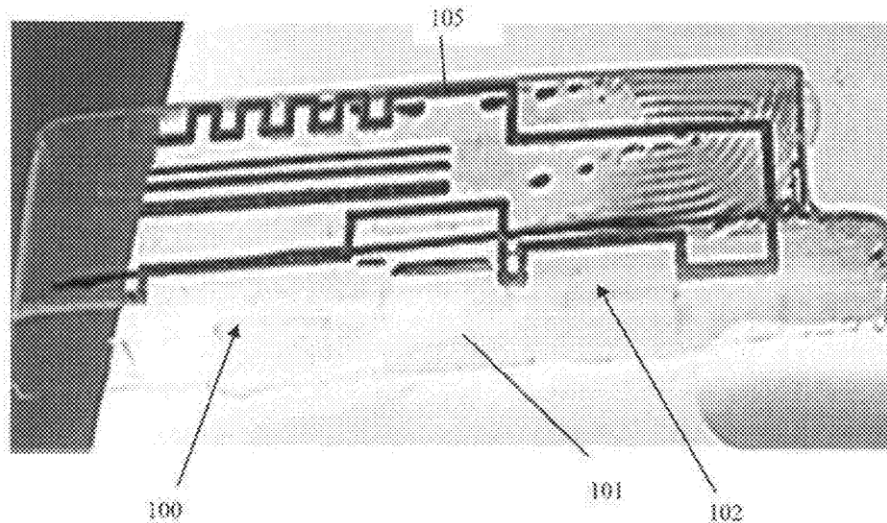
Related U.S. Application Data

(63) Continuation-in-part of application No. 14/031,646, filed on Sep. 19, 2013.

Publication Classification

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

A "thin" and cost-effective three-dimensional antenna assembly and methods of use and manufacturing thereof. In one exemplary embodiment, the solution of the present disclosure is particularly adapted for small form-factor portable radio devices, and comprises an antenna (or array of antennas) deposited on a thin preformed flexible or deformable structure using a conductive fluid. The antenna (array) includes one or more antennas each having a radiator and a plurality of contacts. Use of the thin preformed structure allows, among other things, thinner form factors for the host wireless device, and obviates use of a separate molded carrier or other more costly or involved processes (such as laser direct structuring).





US 20150138036A1

(19) **United States**

(12) **Patent Application Publication**
Harper

(10) **Pub. No.: US 2015/0138036 A1**

(43) **Pub. Date: May 21, 2015**

(54) **ANTENNA ISOLATION USING A TUNED
GROUNDPLANE NOTCH**

Publication Classification

(71) Applicant: **Microsoft Technology Licensing, LLC**,
Redmond, WA (US)

(51) **Int. Cl.**
H01Q 1/48 (2006.01)
H01Q 1/52 (2006.01)

(72) Inventor: **Marc Harper**, Issaquah, WA (US)

(52) **U.S. Cl.**
CPC ... **H01Q 1/48** (2013.01); **H01Q 1/52** (2013.01)

(21) Appl. No.: **14/610,898**

(57) **ABSTRACT**

(22) Filed: **Jan. 30, 2015**

Related U.S. Application Data

(63) Continuation of application No. 14/481,699, filed as
application No. PCT/GB2013/005067 on Mar. 7,
2013.

There is disclosed an antenna device relating to a single or
dual band antenna system for use in mobile telecommunica-
tions devices, laptop and tablet computers, USB adapters and
electrically small radio platforms comprising a pair of anten-
nas attached to a conductive ground plane, the antennas being
separated by free space in which at least one notch is formed
in the conductive ground plane between the pair of antennas
characterized in that the notch further includes an inductive
component and a capacitive component providing good
antenna isolation so as to enable MIMO operation or diversity
operation.

(30) **Foreign Application Priority Data**

Mar. 13, 2012 (GB) 1204373.3

Microsoft Corporation

