



US 20150311579A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0311579 A1**

(43) **Pub. Date: Oct. 29, 2015**

(54) **ELECTRONIC DEVICE ANTENNA CARRIER COUPLED TO PRINTED CIRCUIT AND HOUSING STRUCTURES**

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

CPC ..... *H01Q 1/24* (2013.01)

(71) Applicant: **Apple Inc.**, Cupertino, CA (US)

(57) **ABSTRACT**

(72) Inventors: **Erdinc Irci**, Sunnyvale, CA (US);  
**Hongfei Hu**, Santa Clara, CA (US);  
**Mattia Pascolini**, San Francisco, CA (US);  
**Yijun Zhou**, Sunnyvale, CA (US)

Electronic device antenna structures may include first and second antennas. A housing may have a periphery that is surrounded by peripheral conductive structures such as a segmented peripheral metal member. A segment of the peripheral metal member may be separated from a ground by an opening. An antenna feed for the first antenna may have a positive antenna terminal coupled to the peripheral metal member and a ground terminal coupled to the ground. A return path for the first antenna may span the opening in parallel with the antenna feed. A plastic carrier may be mounted to a printed circuit and a metal housing structure using screws. The plastic carrier may support an antenna resonating element for the second antenna and may support the return path for the first antenna. The screws may short metal structures on the plastic carrier to the metal structures and traces on the printed circuit.

(73) Assignee: **Apple Inc.**, Cupertino, CA (US)

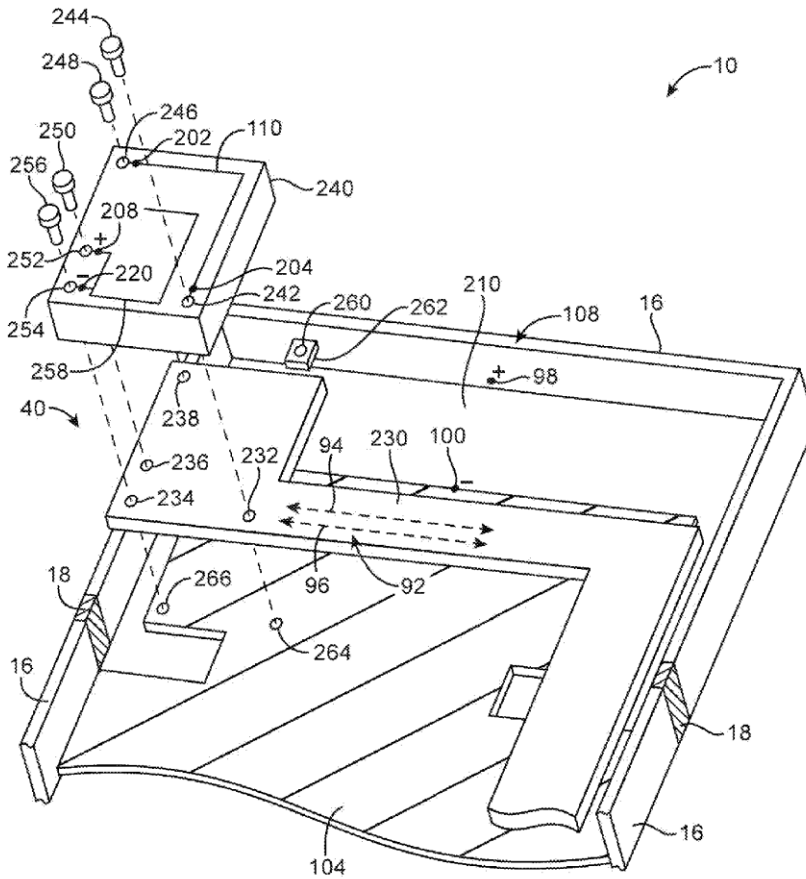
(21) Appl. No.: **14/262,486**

(22) Filed: **Apr. 25, 2014**

**Publication Classification**

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

(2006.01)





US 20150311581A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0311581 A1**

(43) **Pub. Date: Oct. 29, 2015**

(54) **TERMINAL DEVICE**

(71) Applicants: **Lenovo (Beijing) Co., Ltd.**, Beijing (CN); **Beijing Lenovo Software Ltd.**, Beijing (CN)

(72) Inventors: **Dafei Mo**, Beijing (CN); **Kangkang Chen**, Beijing (CN); **Zhaowei Hu**, Beijing (CN); **Xiongbing Gong**, Beijing (CN); **Lu Lu**, Beijing (CN)

(73) Assignees: **BEIJING LENOVO SOFTWARE LTD.**, Beijing (CN); **LENOVO (BEIJING) CO., LTD.**, Beijing (CN)

(21) Appl. No.: **14/791,829**

(22) Filed: **Jul. 6, 2015**

**Related U.S. Application Data**

(62) Division of application No. 13/647,602, filed on Oct. 9, 2012, now Pat. No. 9,112,271.

(30) **Foreign Application Priority Data**

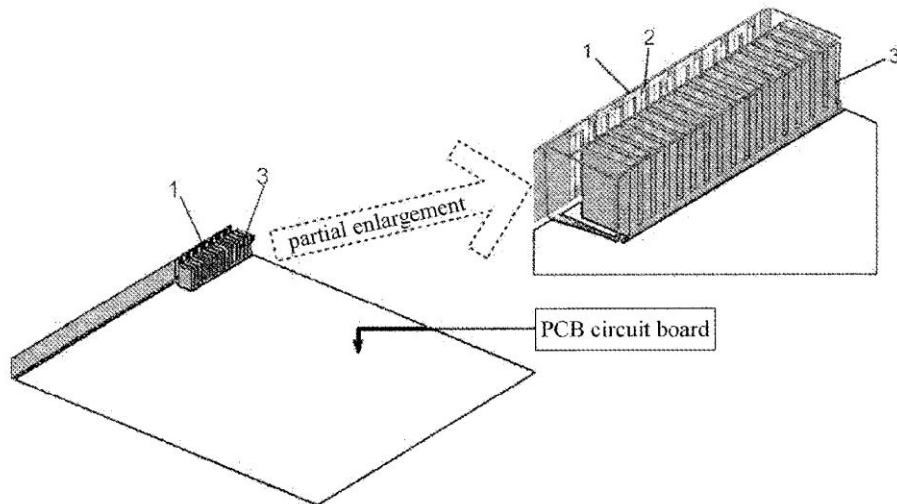
Oct. 9, 2011 (CN) ..... 201110303440.0  
Oct. 24, 2011 (CN) ..... 201110326512.3

**Publication Classification**

(51) **Int. Cl.**  
**H01Q 1/24** (2006.01)  
**H01Q 19/10** (2006.01)  
(52) **U.S. Cl.**  
CPC ..... **H01Q 1/243** (2013.01); **H01Q 19/10** (2013.01)

(57) **ABSTRACT**

A terminal device includes a first house configured to at least accommodate a processing unit and a wireless communication unit. The wireless communication unit is configured to cause the terminal device to perform wireless communication with an external apparatus and exchange data. The wireless communication unit includes an antenna unit configured to receive and transmit a RF signal, a RF circuit connected with the antenna unit and configured to transmit the RF signal to or receive the RF signal from the antenna unit, wherein, an air vent is set on the first house, and the antenna unit is formed by the air vent.





US 20150311588A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0311588 A1**

(43) **Pub. Date: Oct. 29, 2015**

(54) **COMMUNICATION DEVICE AND METHOD FOR DESIGNING MULTI-ANTENNA SYSTEM THEREOF**

(52) **U.S. Cl.**  
CPC ..... *H01Q 3/24* (2013.01); *H01Q 9/0407* (2013.01)

(71) Applicants: **Industrial Technology Research Institute**, Hsinchu (TW); **National Sun Yat-sen University**, Kaohsiung City (TW)

(57) **ABSTRACT**

(72) Inventors: **Kin-Lu Wong**, Kaohsiung City (TW); **Yeh-Chun Kao**, Taoyuan County (TW); **Po-Wei Lin**, Taichung City (TW); **Wei-Yu Li**, Yilan County (TW)

The disclosure provides a communication device. The communication device includes a ground conductor portion and a multi-antenna system. The multi-antenna system includes at least a first and a second resonant portion, each of which is disposed on the corresponding radiating edge of the ground conductor portion. Each of the resonant portions may have a loop resonant structure or may have an open-slot resonant structure, and has a resonant path. The electrical coupling portion makes the length of the resonant path less than or equal to 0.18 times the wavelength of the lowest operating frequency of the multi-antenna system, and thereby excites the corresponding radiating edge and forms a strong surface current distribution, and generates an effective radiating energy and at least one resonant mode, in which the effective radiating energy has a corresponding strongest radiation direction.

(21) Appl. No.: **14/460,377**

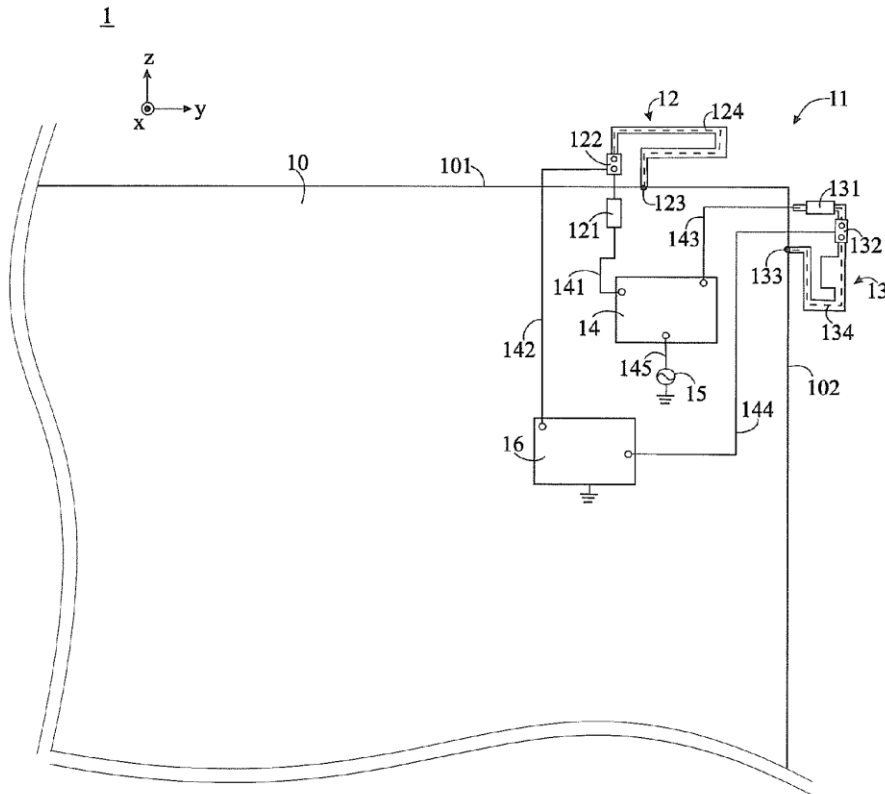
(22) Filed: **Aug. 15, 2014**

(30) **Foreign Application Priority Data**

Apr. 23, 2014 (TW) ..... 103114701

**Publication Classification**

(51) **Int. Cl.**  
*H01Q 3/24* (2006.01)  
*H01Q 9/04* (2006.01)





US 20150311594A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0311594 A1**

(43) **Pub. Date: Oct. 29, 2015**

(54) **ELECTRONIC DEVICES WITH HYBRID ANTENNAS**

(52) **U.S. Cl.**  
CPC ..... *H01Q 13/10* (2013.01); *H01Q 1/243* (2013.01); *H01Q 1/2258* (2013.01)

(71) Applicant: **Apple Inc.**, Cupertino, CA (US)

(72) Inventors: **Jiang Zhu**, Sunnyvale, CA (US);  
**Rodney A. Gomez Angulo**, Sunnyvale, CA (US); **Qingxiang Li**, Mountain View, CA (US); **Robert W. Schlub**, Cupertino, CA (US); **Hongfei Hu**, Santa Clara, CA (US)

(57) **ABSTRACT**

An electronic device may be provided with hybrid planar inverted-F slot antennas and indirectly fed slot antennas. A hybrid antenna may be used to form a dual band wireless local area network antenna. An indirectly fed slot antenna may be used to form a cellular telephone antenna. Antenna slots may be formed in a metal electronic device housing wall. The housing wall may have a planar rear portion and sidewall portions that extend upwards from the planar rear portion. The slots may have one or more bends. A hybrid antenna may have a slot antenna portion and a planar inverted-F antenna portion. The planar inverted-F antenna portion may have a metal resonating element patch that is supported by a support structure. The support structure may be a plastic speaker box containing a speaker driver that is not overlapped by the metal resonating element patch.

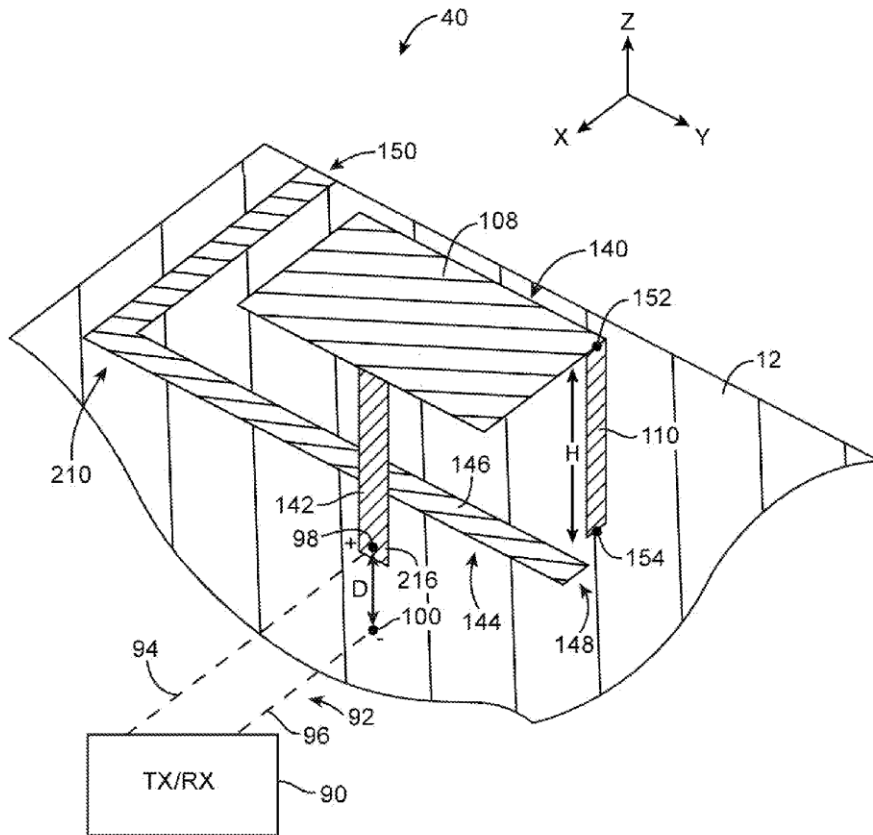
(73) Assignee: **Apple Inc.**, Cupertino, CA (US)

(21) Appl. No.: **14/260,800**

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

**Publication Classification**

(51) **Int. Cl.**  
*H01Q 13/10* (2006.01)  
*H01Q 1/22* (2006.01)  
*H01Q 1/24* (2006.01)





US 20150311595A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0311595 A1**

(43) **Pub. Date: Oct. 29, 2015**

(54) **ANTENNA APPARATUS AND ELECTRONIC DEVICE INCLUDING THE SAME**

**Publication Classification**

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

(51) **Int. Cl.**  
**H01Q 13/10** (2006.01)  
**H01Q 1/24** (2006.01)

(72) Inventors: **Jungsik PARK**, Suwon-si (KR);  
**Wangik SON**, Hwaseong-si (KR)

(52) **U.S. Cl.**  
CPC ..... **H01Q 13/10** (2013.01); **H01Q 1/243**  
(2013.01)

(21) Appl. No.: **14/660,201**

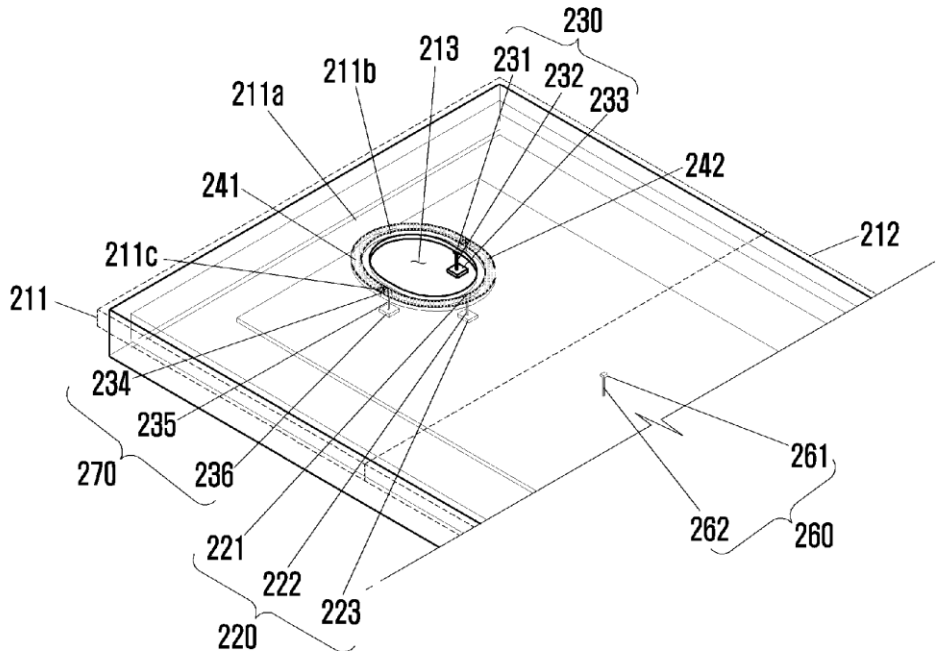
(57) **ABSTRACT**

(22) Filed: **Mar. 17, 2015**

An antenna apparatus is provided. The antenna apparatus includes a first section including at least one slit spaced apart from an outer edge of the antenna apparatus by a predetermined distance, a second section distinguished from the first section through the slit, and a feeding module for supplying a current to at least one of the first section and the second section.

(30) **Foreign Application Priority Data**

Apr. 28, 2014 (KR) ..... 10-2014-0050444





US 20150311881A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0311881 A1**

(43) **Pub. Date: Oct. 29, 2015**

(54) **ANTENNA DEVICE**

**Publication Classification**

(71) Applicant: **MURATA MANUFACTURING CO., LTD.**, Kyoto (JP)

(51) **Int. Cl.**  
*H03H 7/40* (2006.01)  
*H01Q 1/50* (2006.01)

(72) Inventors: **Shoji NAGUMO**, Kyoto (JP); **Masashi NAKAZATO**, Kyoto (JP); **Motoyasu NAKAO**, Kyoto (JP); **Yuji SHINTOMI**, Kyoto (JP)

(52) **U.S. Cl.**  
CPC .. *H03H 7/40* (2013.01); *H01Q 1/50* (2013.01)

(73) Assignee: **MURATA MANUFACTURING CO., LTD.**, Kyoto (JP)

(57) **ABSTRACT**

(21) Appl. No.: **14/331,625**

A stray capacitance is generated between an antenna element and a ground electrode. A capacitance detection circuit detects the stray capacitance. An antenna matching circuit, is provided along a wireless communication signal path, which is a transmission path between the antenna element and a feeder circuit. A feedback control circuit transmits a control signal to the variable matching circuit on the basis of a detection result of the capacitance detection circuit in accordance with the stray capacitance. The capacitance detection circuit includes a constant current source and a timing circuit to measure the time taken to charge the antenna from the constant current source and for the voltage to reach a predetermined voltage.

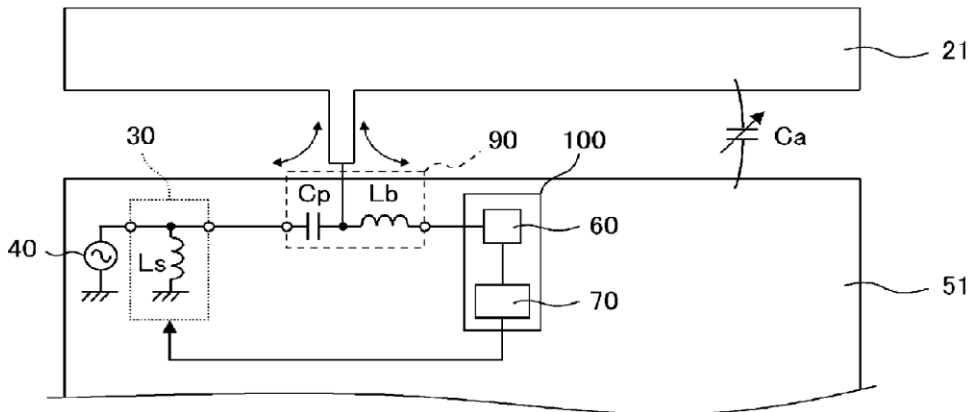
(22) Filed: **Jul. 15, 2014**

**Related U.S. Application Data**

(63) Continuation of application No. PCT/JP2013/053308, filed on Feb. 13, 2013.

(30) **Foreign Application Priority Data**

Mar. 5, 2012 (JP) ..... 2012-047550





US 20150311969A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0311969 A1**

(43) **Pub. Date: Oct. 29, 2015**

(54) **MODAL ANTENNA BASED  
COMMUNICATION NETWORK AND  
METHODS FOR OPTIMIZATION THEREOF**

(52) **U.S. Cl.**  
CPC ..... **H04B 7/082** (2013.01); **H04B 7/1555**  
(2013.01); **H04W 72/046** (2013.01)

(71) Applicant: **ETHERTRONICS, INC.**, San Diego,  
CA (US)

(57) **ABSTRACT**

(72) Inventors: **Laurent Desclos**, San Diego, CA (US);  
**Jeffrey Shamblin**, San Marcos, CA (US)

(73) Assignee: **ETHERTRONICS, INC.**, San Diego,  
CA (US)

(21) Appl. No.: **14/662,176**

(22) Filed: **Mar. 18, 2015**

**Related U.S. Application Data**

(60) Provisional application No. 61/955,163, filed on Mar.  
18, 2014.

**Publication Classification**

(51) **Int. Cl.**  
**H04B 7/08** (2006.01)  
**H04W 72/04** (2006.01)  
**H04B 7/155** (2006.01)

A communication network is optimized using modal antenna techniques, wherein a plurality of communication nodes are synchronized with each other along with mobile and fixed wireless communication devices which comprise the user base. With one or more of the communication nodes and wireless communication devices including at least one respective modal antenna, the network is adapted for dynamic optimization of communication links amongst the wireless users. Node to user throughput, node to node throughput, as well as interference characteristics among the nodes and wireless users are each optimized as a network system to increase communication system network capacity and reliability. The multiple radiation patterns provided by the modal antennas provide a parametric for network-level synchronization to improve communication system performance.

	RSSI, CQI, or other metric					
	AP1	AP2	APn	Device 1	Device 2	Device n
Mode 1	...	...	...	...	...	...
Mode 2	...	...	...	...	...	...
....	...	...	...	...	...	...
Mode N	...	...	...	...	...	...



US 20150312058A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0312058 A1**

(43) **Pub. Date: Oct. 29, 2015**

(54) **APPARATUS AND METHOD FOR ANTENNA MATCHING**

*H04B 3/03* (2006.01)

*H01Q 1/50* (2006.01)

*H03H 7/40* (2006.01)

(71) Applicant: **MOTOROLA MOBILITY LLC**,  
Chicago, IL (US)

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

CPC ..... *H04L 25/0278* (2013.01); *H01Q 1/50*

(2013.01); *H03H 7/40* (2013.01); *H04B 3/03*

(2013.01); *H04B 1/3833* (2013.01)

(72) Inventors: **Gregory R. Black**, Vernon Hills, IL (US); **Vijay L. Asrani**, Round Lake, IL (US); **Young Hun Kim**, Buffalo Grove, IL (US)

(57)

**ABSTRACT**

(73) Assignee: **MOTOROLA MOBILITY LLC**,  
Chicago, IL (US)

A method and apparatus are for performing antenna matching and include determining a cable connection state of a cable connector, generating a cable detection signal that indicates the cable connection state, and modifying impedance transform of a tunable matching circuit in response to the cable detection signal. The cable detection signal indicates one of a presence and an absence of a cable connector. The tunable matching circuit couples a transceiver and an antenna. The tunable matching circuit couples the selected impedance transform between the transceiver and the antenna. The apparatus is a radio communication device that includes a transceiver, a processing system, an antenna, a tunable matching circuit, an input/output section, a cable connector, and a sensor.

(21) Appl. No.: **14/280,775**

(22) Filed: **May 19, 2014**

**Related U.S. Application Data**

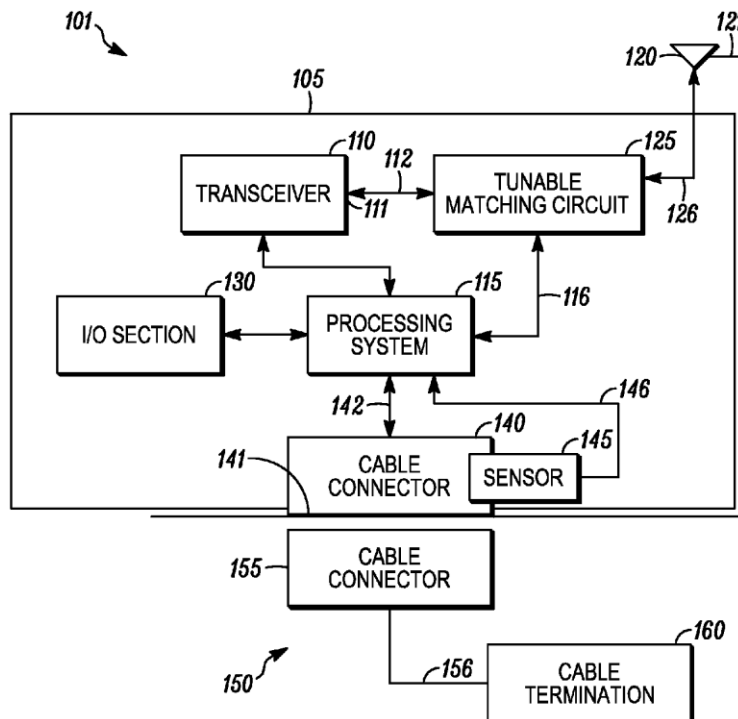
(60) Provisional application No. 61/984,927, filed on Apr. 28, 2014.

**Publication Classification**

(51) **Int. Cl.**

*H04L 25/02* (2006.01)

*H04B 1/3827* (2006.01)







US 20150318601A1

(19) **United States**

(12) **Patent Application Publication**  
LIN

(10) **Pub. No.: US 2015/0318601 A1**

(43) **Pub. Date: Nov. 5, 2015**

(54) **ANTENNA STRUCTURE AND WIRELESS COMMUNICATION DEVICE USING THE SAME**

(52) **U.S. Cl.**  
CPC . *H01Q 1/243* (2013.01); *H01Q 1/48* (2013.01)

(71) Applicant: **Chiun Mai Communication Systems, Inc.**, New Taipei (TW)

(57) **ABSTRACT**

(72) Inventor: **YEN-HUI LIN**, Tu-Cheng (TW)

(21) Appl. No.: **14/576,791**

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

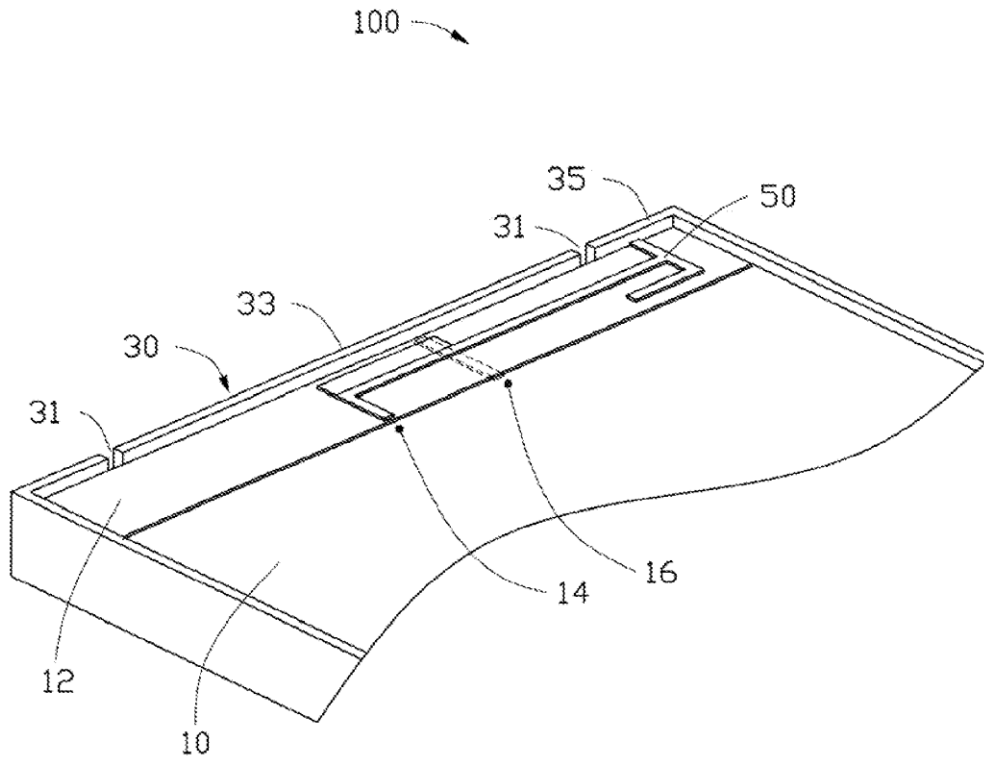
(30) **Foreign Application Priority Data**

Apr. 30, 2014 (CN) ..... 201410179877.1

**Publication Classification**

(51) **Int. Cl.**  
*H01Q 1/24* (2006.01)  
*H01Q 1/48* (2006.01)

A wireless communication device includes a metallic housing and an antenna structure. The metallic housing includes a bottom frame and a side frame spaced from the bottom frame. The antenna structure includes a feed end plate, a ground end plate, a main radiator, and a coupling section. The ground end plate is coupled to the bottom frame. The main radiator is coupled between the feed end plate and the side frame. The coupling section is coupled to the main radiator and extending parallel to the bottom frame. A first end of the coupling section is coupled to a distal end of the feed end plate, and a second end of the coupling section extends towards the ground end plate, current is coupled from the feed end plate to the ground end plate via the coupling section and is coupled from the coupling section to the bottom frame.





US 20150325915A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0325915 A1**

(43) **Pub. Date: Nov. 12, 2015**

(54) **MULTI-BAND ANTENNA**

**Publication Classification**

(71) Applicants: **UNIVERSAL SCIENTIFIC INDUSTRIAL (SHANGHAI) CO., LTD.**, Shanghai (CN); **UNIVERSAL GLOBAL SCIENTIFIC INDUSTRIAL CO., LTD.**, Nantou County (TW)

(51) **Int. Cl.**  
**H01Q 5/371** (2006.01)  
**H01Q 7/00** (2006.01)  
(52) **U.S. Cl.**  
CPC . **H01Q 5/371** (2015.01); **H01Q 7/00** (2013.01)

(72) Inventors: **CHAO-AN LYU**, NANTOU COUNTY (TW); **JUI-CHIH CHIEN**, NANTOU COUNTY (TW); **HUNG-WEI CHIU**, NANTOU COUNTY (TW)

(57) **ABSTRACT**

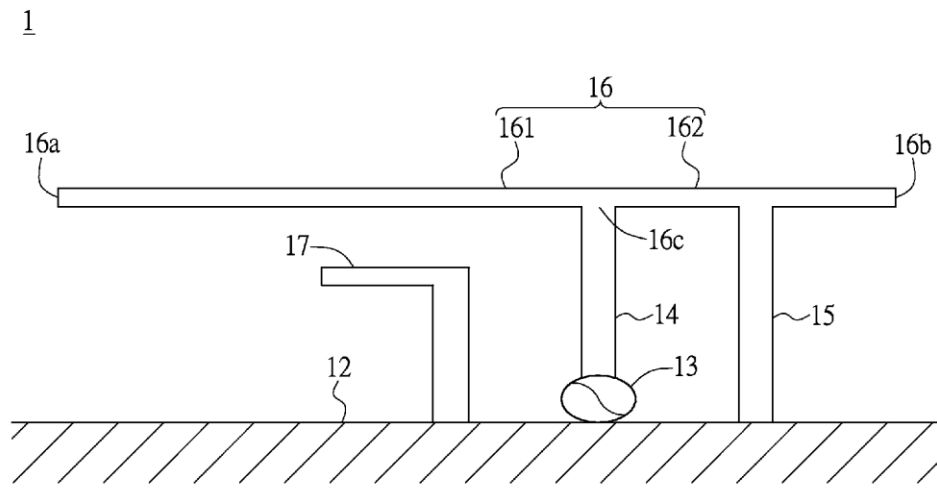
A multi-band antenna and electronic device are provided. The multi-frequency antenna includes a feeding portion, a shorting portion, a radiating portion and a loop radiating portion. One end of the feeding portion is electrically connected to a signal source. One end of the shorting portion is electrically connected to a ground plane. The radiating portion is electrically connected to another end of the shorting portion and another end of the feeding portion. The loop radiating portion is electrically connected to the radiating portion.

(21) Appl. No.: **14/532,090**

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

(30) **Foreign Application Priority Data**

May 9, 2014 (TW) ..... 103116536





US 20150326264A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0326264 A1**

(43) **Pub. Date: Nov. 12, 2015**

(54) **WIRELESS COMMUNICATION DEVICE**

**Publication Classification**

(71) Applicant: **Telefonaktiebolaget L M Ericsson (publ)**, Stockholm (SE)

(51) **Int. Cl.**  
**H04B 1/3827** (2006.01)

(72) Inventors: **Andreas NILSSON**, Goteborg (SE);  
**Anders Derneryd**, Goteborg (SE);  
**Anders STJERNMAN**, Lindome (SE)

(52) **U.S. Cl.**  
CPC ..... **H04B 1/3838** (2013.01)

(73) Assignee: **Telefonaktiebolaget L M Ericsson (publ)**, Stockholm (SE)

(57) **ABSTRACT**

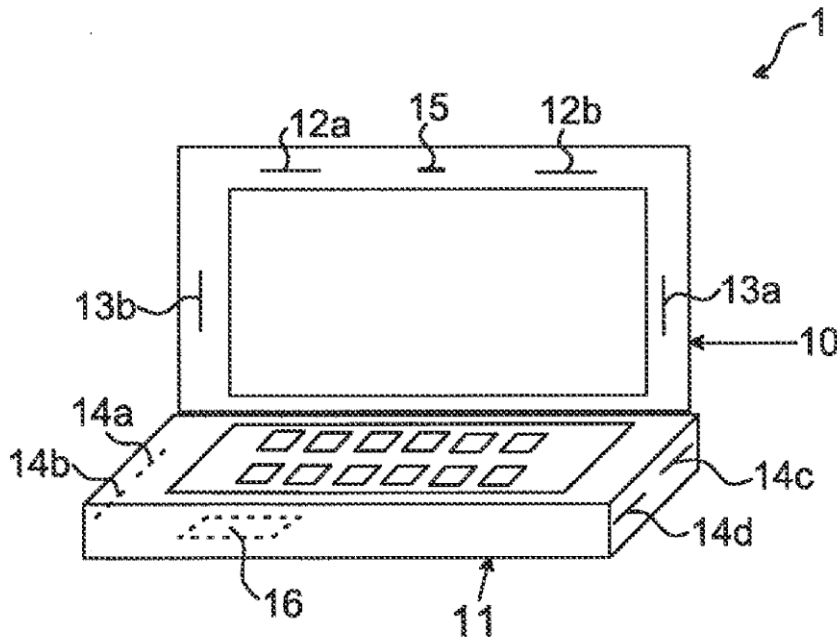
(21) Appl. No.: **14/730,120**

(22) Filed: **Jun. 3, 2015**

**Related U.S. Application Data**

(63) Continuation of application No. 13/984,477, filed on Aug. 8, 2013, filed as application No. PCT/EP2011/051820 on Feb. 8, 2011.

The invention relates to a wireless communication device 1 having an upper part 10 and a bottom part 11, the upper part 10 comprising one or more transmission antenna device(s) 12a, 12b; 15. The upper part 10 and the bottom part 11 are arranged movably in relation to each other, so that the bottom part 11, in use mode, is closer to the user than the upper part 10. The bottom part 11 comprises one or more reception antenna device(s) 14a, 14b, 14c, 14d.





US 2015033390A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0333390 A1**

(43) **Pub. Date: Nov. 19, 2015**

(54) **WIDEBAND ANTENNA AND WIRELESS COMMUNICATION DEVICE**

**Publication Classification**

(71) Applicant: **Wistron NeWeb Corporation**, Hsinchu (TW)

(51) **Int. Cl.**  
*H01Q 1/24* (2006.01)  
*H01Q 7/00* (2006.01)

(72) Inventors: **Huang-Tse Peng**, Hsinchu (TW); **Kuo-Jen Lai**, Hsinchu (TW); **Wen-Tsan Chung**, Hsinchu (TW); **Cheng-Feng Li**, Hsinchu (TW); **Yu-Yi Chu**, Hsinchu (TW)

(52) **U.S. Cl.**  
CPC . *H01Q 1/243* (2013.01); *H01Q 7/00* (2013.01)

(57) **ABSTRACT**

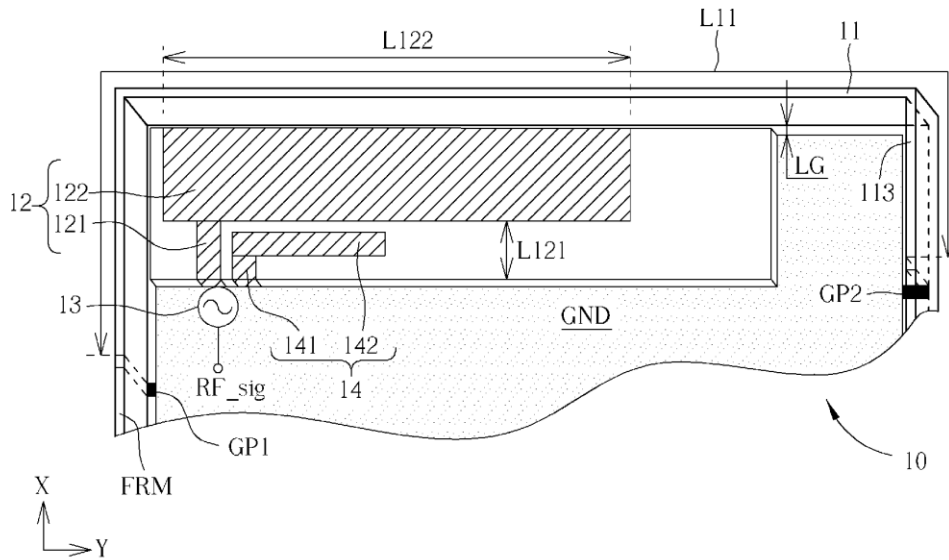
A wideband antenna includes a first radiator formed as a part of a metal frame for resonating a first signal component of a radio-frequency signal, a second radiator disposed within an area enclosed by the metal frame for resonating a second signal component of the radio-frequency signal, and a feed terminal electrically connected between the second radiator and a ground for feeding the radio-frequency signal, wherein there is a distance between the first and second radiators such that a coupling effect is induced between the first and second radiators, which allows the first signal component being fed from the second radiator into the first radiator via the coupling effect.

(21) Appl. No.: **14/464,717**

(22) Filed: **Aug. 21, 2014**

(30) **Foreign Application Priority Data**

May 16, 2014 (TW) ..... 103117361





US 2015033396A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0333396 A1**

(43) **Pub. Date: Nov. 19, 2015**

(54) **MULTI-BAND ANTENNA**

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

CPC ... *H01Q 1/50* (2013.01); *H01Q 1/48* (2013.01)

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

(57)

**ABSTRACT**

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

A multi-band antenna includes a feeder cable including an inner wire and an outer braider, and an antenna body. The antenna includes a longitudinal grounding portion along a first direction, a first connecting portion and a second connecting portion extending from opposite first and second ends of the grounding portion, a first arm extending from the first connecting portion and a second arm extending from the second connecting portion along the first direction. The second connecting portion defines a signal joint point at a corner near to the first arm and the grounding portion, the inner wire of the feeder cable is soldered to the joint point and the outer braider of the feeder cable is soldered to the grounding portion. The first arm and the second arm are partly overlapped in a second direction perpendicular to the first direction.

(21) Appl. No.: **14/709,482**

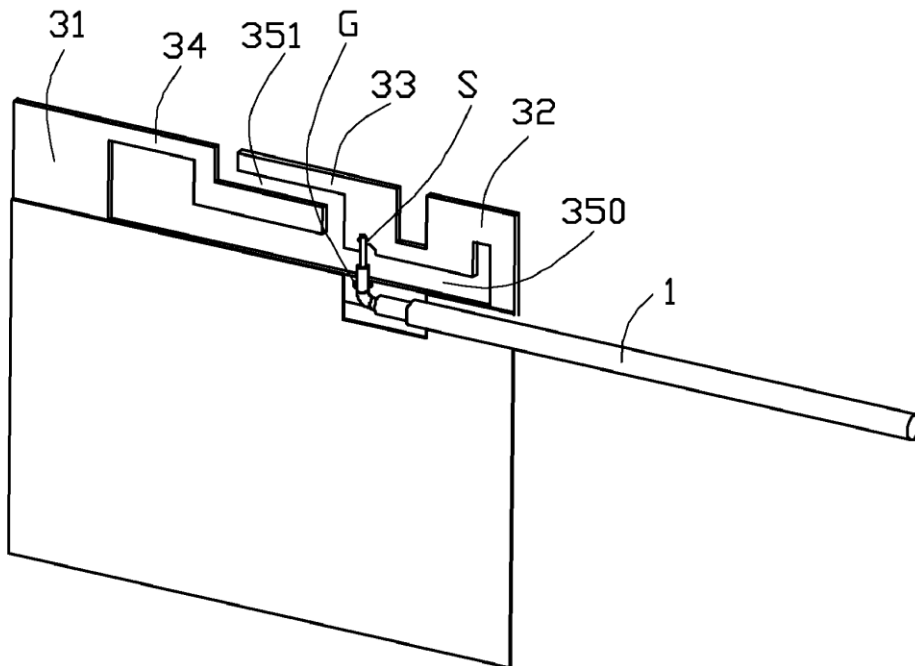
(22) Filed: **May 12, 2015**

(30) **Foreign Application Priority Data**

May 14, 2014 (TW) ..... 103208360

**Publication Classification**

(51) **Int. Cl.**  
*H01Q 1/50* (2006.01)  
*H01Q 1/48* (2006.01)





US 20150333399A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0333399 A1**

(43) **Pub. Date: Nov. 19, 2015**

(54) **TUNABLE LONG TERM EVOLUTION ANTENNA**

(52) **U.S. Cl.**  
CPC . **H01Q 5/307** (2015.01); **H01Q 5/10** (2015.01)

(71) Applicant: **AUDEN TECHNO CORP.**, Taoyuan County (TW)

(57) **ABSTRACT**

(72) Inventors: **YU-TSUNG HUANG**, KAOHSIUNG CITY (TW); **YEN-CHAO LI**, TAOYUAN COUNTY (TW)

(73) Assignee: **AUDEN TECHNO CORP.**, Taoyuan County (TW)

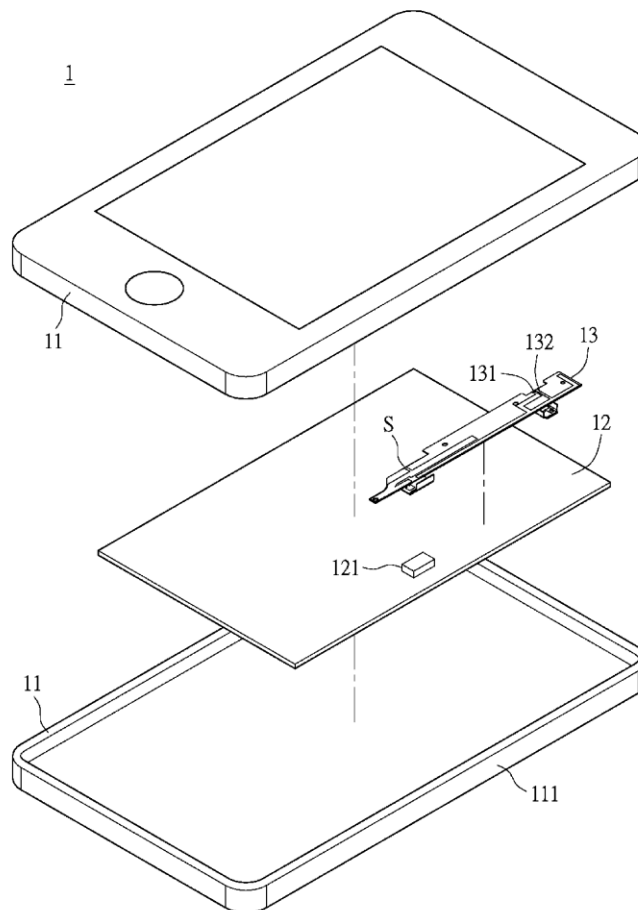
(21) Appl. No.: **14/276,931**

(22) Filed: **May 13, 2014**

**Publication Classification**

(51) **Int. Cl.**  
**H01Q 5/307** (2006.01)  
**H01Q 5/10** (2006.01)

A tunable long term evolution antenna comprises a feeding portion, a grounding portion, a first radiation portion, a second radiation portion and a coupling radiation portion. The shape of the first radiation portion is a strip. Two terminals of the strip respectively are a first terminal and a second terminal. The first terminal is connected to the feeding portion and the grounding portion. The second radiation portion is connected to the grounding portion and the first terminal of the first radiation portion. The coupling radiation portion has a switching terminal coupled to a switch, a low frequency coupling portion and a high frequency coupling portion. The switch controls the switching terminal to be coupled to the ground or floating. The tunable long term evolution antenna operates in a LTE technology mode or a 3G mode depending on the switching terminal is coupled to the ground floating.





US 20150333403A1

(19) **United States**

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

(10) **Pub. No.: US 2015/0333403 A1**

(43) **Pub. Date: Nov. 19, 2015**

(54) **COMMUNICATION DEVICE WITH ANTENNA ELEMENT**

(52) **U.S. Cl.**  
CPC ..... *H01Q 5/50* (2015.01)

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

(57) **ABSTRACT**

(72) Inventors: **Kin-Lu Wong**, New Taipei City (TW);  
**Zih-Guang Liao**, New Taipei City (TW)

A communication device including a ground element and an antenna element is provided. The antenna element includes a metal element. The metal element is disposed adjacent to an edge of the ground element. The metal element has a first connection point and a second connection point. A feeding point of the antenna element is coupled through an inductive element to the first connection point. A first feeding path is formed from the feeding point through the inductive element to the first connection point. The feeding point of the antenna element is further coupled through a capacitive element to the second connection point. A second feeding path is formed from the feeding point through the capacitive element to the second connection point. The feeding point of the antenna element is further coupled through a matching circuit to a signal source.

(21) Appl. No.: **14/338,691**

(22) Filed: **Jul. 23, 2014**

(30) **Foreign Application Priority Data**

May 16, 2014 (TW) ..... 103117263

**Publication Classification**

(51) **Int. Cl.**  
*H01Q 5/50* (2006.01)

