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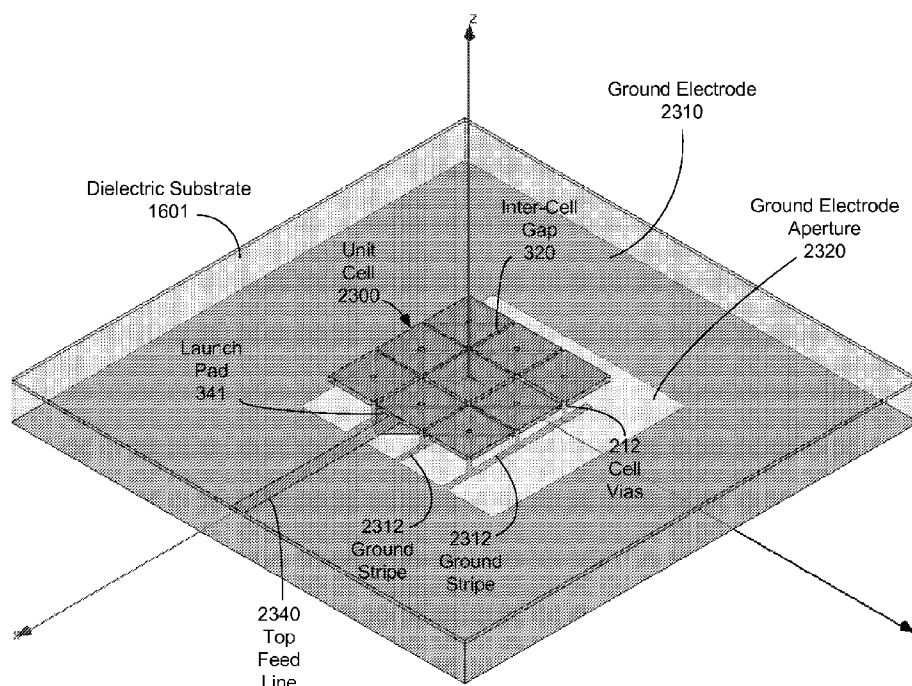
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(54) Title: ANTENNAS BASED ON METAMATERIAL STRUCTURES



(57) Abstract: Techniques, apparatus and systems that use one or more composite left and right handed (CRLH) metamaterial structure in processing and handling electromagnetic wave signals. Antennas and antenna arrays based on enhanced CRLH metamaterial structures are configured to provide broadband resonances for various multi-band wireless communications.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 07/76791

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H01Q 19/06 (2008.01)

USPC - 343/754

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

USPC: 343/754

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 343/754; 343/753; 343/909; 343/756; 343/700MS (search term limited)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WEST (DB=USPAT, USGPB, EPAB, JPAB); Google search, terms including: dielectric, cell, substrate, ground, antenna, conductive patch, CRLH, right hand, left hand, signal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/0011522 A1 (MCKINZIE et al.) 16 January 2003 (16.01.2003) para [0026]-[0083], fig 2	25
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Y		1-24
Y	US 5,511,238 A (BAYRAKTAROGU) 23 April 1996 (23.04.1996) col 5, ln 55 to col 6, ln 15.	1-24
Y	US 2004/0227668 A1 (SIEVENPIPER) 18 November 2004 (18.11.2004) para [0021], fig 5(a).	8-24
Y	US 6,525,695 B2 (MCKINZIE) 25 February 2003 (25.02.2003) col 11, ln 11-30.	19, 20

☐ Further documents are listed in the continuation of Box C.

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"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

15 January 2008 (15.01.2008)

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