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[Continued on next page]

(54) Title: ACTIVE HYBRIDS FOR ANTENNA SYSTEMS

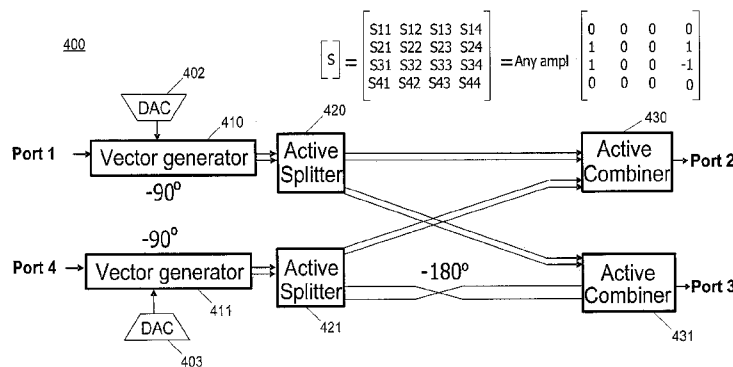
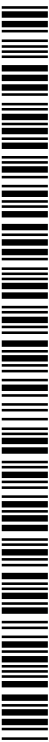


Figure 4C

(57) Abstract: In an exemplary embodiment, a fully monolithic active hybrid architecture can be configured to replace a ring hybrid, magic tee, branchline coupler, or 180 hybrid by providing similar functionality in an integrated monolithic solution. Exemplary embodiments of the active hybrids combine active implementations of power splitters, power combiners, and phase shifting elements in a novel fashion allowing for ultra-compact size and broadband performance. In an exemplary embodiment, the active hybrid replaces the typical hybrid couplers with active splitters and active combiners. Similarly, the delay lines and amplitude adjustment elements are replaced by active vector generators. Vector generators are magnitude and phase control circuits. The active hybrid results in certain advantages including being size independent of the operating frequency, wide frequency range of operation, and RF signals undergo a neutral or slight positive power gain, rather than power losses that occur in the passive prior art systems.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2010/030877**A. CLASSIFICATION OF SUBJECT MATTER****H01Q 23/00(2006.01)i, H01Q 3/26(2006.01)i**

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H01Q 23/00; H04B 1/26

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: hybrid, coupler, active, tr*, amp*, vector, splitter, divider, combiner

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4896374 A (WAUGH, RAYMOND M. et al.) 23 January 1990	1,3,4,7-10,12-14
A	See the abstract; figures 2A-6; column 3 line 51 - column 6 line 46; and claims 1-11	2,5,6,11,15-19
A	TOKUMITSU, TSUNEO et al. "Active isolator, combiner, divider, and magic-T as miniaturized function blocks," 10th Annual IEEE Gallium Arsenide Integrated Circuit Symposium 1988, 6-9 November 1988, Nashville, TN USA, pp. 273-276 See the abstract; figures 1-3, 6; pages 273-276	1-19
A	FERRERO, F. et al. "Compact quasi-lumped hybrid coupler tunable over large frequency band," IET Electronics Letters, vol. 43, no. 19, pp. 1030-1031, 13 September 2007 See the abstract; figures 1, 2; page 1030	1-19
A	LEE, CHENG-JUNG et al. "Broadband Quadrature Hybrid Design Using Metamaterial Transmission Line and Its Application in the Broadband Continuous Phase Shifter," IEEE/MTT-S International Microwave Symposium 2007, 3-8 June 2007, Honolulu, HI USA, pp. 1745-1748 See the abstract; figures 1, 2; pages 1745, 1746	1-19

 Further documents are listed in the continuation of Box C. See patent family annex.

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"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

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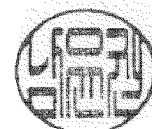
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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4896374 A	23.01.1990	None	