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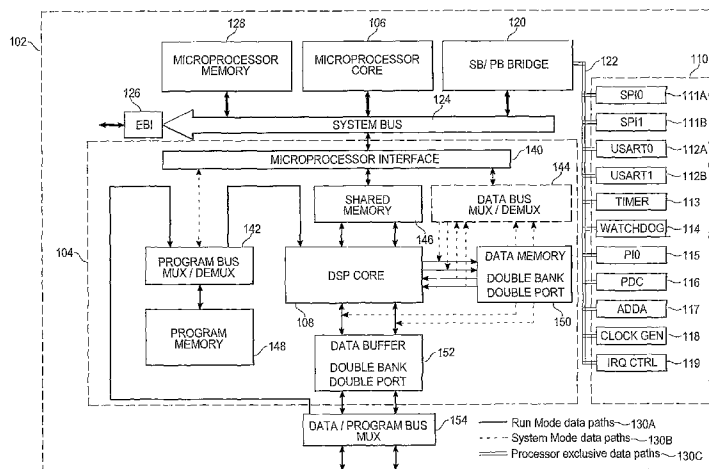
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**Declarations under Rule 4.17:**

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

[Continued on next page]

(54) Title: DUAL-PROCESSOR COMPLEX DOMAIN FLOATING-POINT DSP SYSTEM ON CHIP



(57) Abstract: A system for digital signal processing, configured as a system on chip (SoC) (102), combines a microprocessor core (106) and digital signal processor (DSP) core (108) with floating-point data processing capability. The DSP core (108) can perform operations on floating-point data in a complex domain and is capable of producing real and imaginary arithmetic results simultaneously. This capability allows a single-cycle execution of, for example, FFT butterflies, complex domain simultaneous addition and subtraction, complex multiply accumulate (MULACC), and real domain dual multiply-accumulators (MACs). The SoC (102) may be programmed entirely from a microprocessor programming interface (140), using calls from a DSP library to execute DSP functions. The cores (106, 108) may also be programmed separately. Capability for programming and simulating the entire SoC (102) are provided by a separate programming environment. The SoC (102) may have heterogeneous processing cores in which either processing core may act as master or slave, or both cores may operate simultaneously and independently.

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— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US05/07231

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC: **G06F 7/38( 2006.01);G06F 9/302( 2006.01);G06F 15/16( 2006.01)**  
  
 USPC: 708/511,622;712/35,222  
 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)  
 U.S. : 708/511, 622; 712/35, 222  
  
 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
  
 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2003/0009052 A1 (KATANAYAGI) 09 January 2003 (09.01.2003), figs. 2, 3, and 8; pars. 21, 83, 204-206, and 211.	1, 11-16, 35 ----- 17, 36, 41-46
Y	US 4,996,661 A (COX et al) 26 February 1991 (26.02.1991), fig. 1; col. 2, lines 39-68.	1-17, 35-46
Y	US 5,053,987 A (GESUNOV et al) 01 October 1991 (01.10.1991), col. 2, lines 14-50.	1-17, 35-46
Y	US 5,960,209 A (BLOUNT et al) 28 September 1999 (28.09.1999) cols. 7 and 8.	4, 36-40
Y	US 6,023,757 B1 (NISHIMOTO et al) 08 February 2000 (08.02.2000), figs. 1, 2, 6, and 7; col. 6, lines 46-61; col. 7, line 41; col. 9, line 53; col. 10, line 25; col. 11, lines 16, 17, and 47.	1-17, 35-46

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

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent published on or after the international filing date	"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
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search: 10 October 2006 (10.10.2006)  
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Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Kenneth S. KIM <i>James R. Matthew</i> Telephone No. (571)272-2100
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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/07231

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:  
Please See Continuation Sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
  2.  As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of any additional fees.
  3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
  4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-17 and 35-46
- Remark on Protest**
- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
  - The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
  - No protest accompanied the payment of additional search fees.

**BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING**

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, Claims 1-17 and 35-46, drawn to a processor operating on floating point data in a complex domain.

Group II, claims 18-34, drawn to a method of code development and compiling.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The invention of group I lacks code development and compiling.

The invention of group II lacks a processor operating on floating point data in a complex domain.