Title: DIGITAL DATATransFER BETWEEN DIFFERENT CLOCK DOMAINS

Abstract: One or more aspects of the present invention pertain to transferring digital data between first (502) and second (504) domains, where a first clock (512) of the first domain (502) operates at a first frequency and a second clock (520) of the second domain (504) operates at a second frequency, where the first frequency is higher than the second frequency, and where the first (512) and second (520) clocks have arbitrary phase relationships relative to one another. Techniques employed facilitate efficient digital data transfer between the first (502) and second (504) domains while conserving valuable semiconductor real estate.
A. CLASSIFICATION OF SUBJECT MATTER

INV: H04L7/00

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)

H04L

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No</th>
</tr>
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<tbody>
<tr>
<td>X</td>
<td>EP 1 071 005 A2 (THOMSON LICENSING SA [FR]) 24 January 2001 (2001-01-24) paragraphs [0002], [0005], [0017], [0021] page 1, line 32; figures 3-7</td>
<td>1-8</td>
</tr>
</tbody>
</table>

D. 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

**E** earlier document but published on or after the international filing date

**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)

**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

**A** document member of the same patent family

Date of the actual completion of the international search

10 January 2007

Date of mailing of the international search report

05/04/2007

Name and mailing address of the ISA/

European Patent Office, P B 5818 Patentlaan 2 NL - 2280 HV Rijswijk

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Authorized officer

Pieper, Thomas
Box 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 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:

see additional 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 an additional fee, this Authority did not invite payment of any additional fee.

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.:

1-8

Remark on Protest

[ ] The additional search fees were accompanied by the applicant's protest.

[ ] No protest accompanied the payment of additional search fees.
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-8

   Systems facilitating data transfer between clock domains by using a flip-flop and a multiplexer in feedback (Fig. 5).

2. claims: 9,10

   System facilitating data transfer from a low frequency clock domain to a higher frequency clock domain by a feed forward arrangement of a flip-flop and a multiplexer, the multiplexer operated by a complementary control signal (Fig. 6).
<table>
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<th>Patent family member(s)</th>
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<tr>
<td></td>
<td>JP 2001077797 A</td>
<td>23-03-2001</td>
<td></td>
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<tr>
<td></td>
<td>KR 20010049781 A</td>
<td>15-06-2001</td>
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<tr>
<td></td>
<td>US 6549593 B1</td>
<td>15-04-2003</td>
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<td></td>
<td>JP 2003143117 A</td>
<td>16-05-2003</td>
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Form PCT/ISA/210 (patent family annex) (April 2005)