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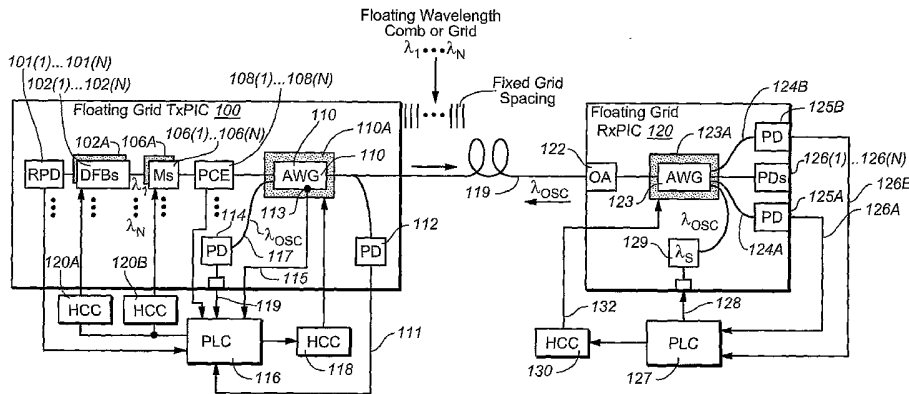
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Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

[Continued on next page]

(54) Title: COOLERLESS AND FLOATING WAVELENGTH GRID PHOTONIC INTEGRATED CIRCUITS (PICs) FOR WDM TRANSMISSION NETWORKS



(57) Abstract: A coolerless photonic integrated circuit (PIC), such as a semiconductor electro-absorption modulator/laser (EML) or a coolerless optical transmitter photonic integrated circuit (TxPIC), may be operated over a wide temperature range at temperatures higher than room temperature without the need for ambient cooling or hermetic packaging. Since there is large scale integration of N optical transmission signal WDM channels on a TxPIC chip, a new DWDM system approach with novel sensing schemes and adaptive algorithms provides intelligent control of the PIC to optimize its performance and to allow optical transmitter and receiver modules in DWDM systems to operate uncooled. Moreover, the wavelength grid of the on-chip channel laser sources may thermally float within a WDM wavelength band where the individual emission wavelengths of the laser sources are not fixed to wavelength peaks along a standardized wavelength grid but rather may move about with changes in ambient temperature. However, control is maintained such that the channel spectral spacing between channels across multiple signal channels, whether such spacing is periodic or aperiodic, between adjacent laser sources in the thermally floating wavelength grid are maintained in a fixed relationship. Means are then provided at an optical receiver to discover and lock onto floating wavelength grid of transmitted WDM signals and thereafter demultiplex the transmitted WDM signals for OE conversion.

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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/US2005/012761

A. CLASSIFICATION OF SUBJECT MATTER
INV. G02B6/34

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)
G02B

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, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 903 601 A (LUCENT TECHNOLOGIES INC) 24 March 1999 (1999-03-24) column 3, paragraph 11 -----	1-30, 39-58
Y	US 4 993 032 A (BRADLEY ET AL) 12 February 1991 (1991-02-12) abstract -----	1-30, 39-58
Y	GB 2 382 461 A (* DENSELIGHT SEMICONDUCTORS PTE LTD) 28 May 2003 (2003-05-28) page 3, line 20 - line 30 -----	1-30, 39-58
Y	PATENT ABSTRACTS OF JAPAN vol. 2003, no. 12, 5 December 2003 (2003-12-05) & JP 2003 295136 A (AGILENT TECHNOL INC), 15 October 2003 (2003-10-15) abstract -----	1-30, 39-58

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.
- "&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

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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.:

1-18, 19-30, 39-49, 50-58

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-18,19-30,39-49,50-58,

Claims 1-18, 19-30 and 39-49 are directed to a coolerless photonic integrated circuit and a floating wavelength grid, claims 50-58 are directed to the related method claim.

2. claims: 31,32,33-38

Stabilized wavelength grid

3. claims: 59-71,72-75

A photodetector unit and a network using such a unit

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2005/012761

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			US 5943456 A	24-08-1999

US 4993032	A	12-02-1991	NONE	

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JP 2003295136	A	15-10-2003	EP 1341333 A2	03-09-2003
			US 2003165173 A1	04-09-2003
