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(71) Applicant(s)
International Computers Limited

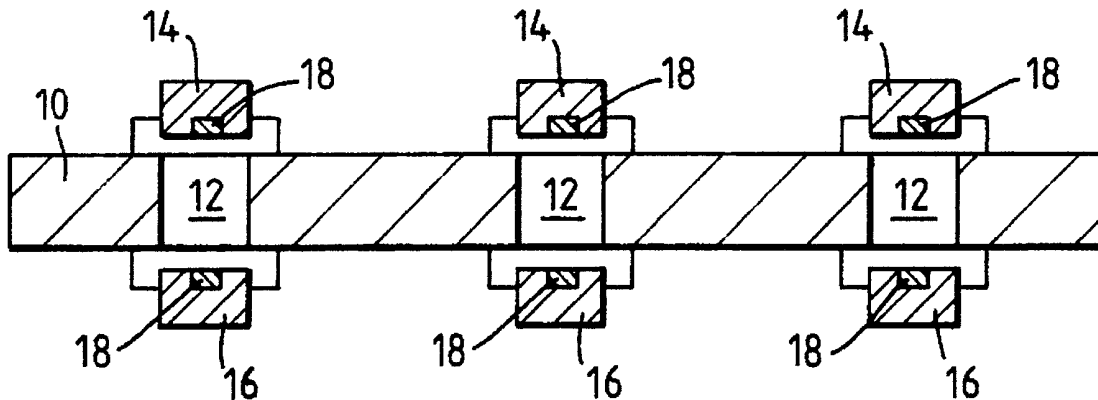
(Incorporated in the United Kingdom)

**ICL House, 1 High Street, Putney, LONDON,
SW15 1SW, United Kingdom**
(72) Inventor(s)
Phillip George Brereton Hamilton
(74) Agent and/or Address for Service
D C Guyatt
**International Computers Limited, Intellectual
Property Dept, Cavendish Road, STEVENAGE,
Hertfordshire, SG1 2DY, United Kingdom**

(54) **Electronic circuit assembly with optically transmissive vias**

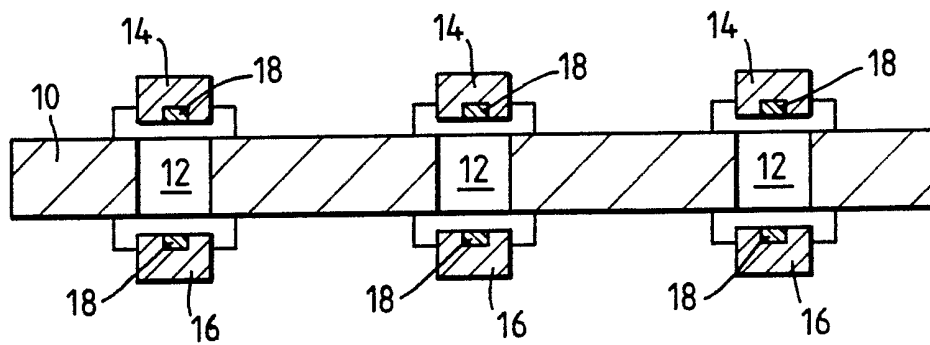
(57) An electronic circuit assembly consists of a printed circuit board (10) having electronic components (14, 16) mounted on opposite faces of the board. The board has optically transmissive vias (12) extending between the opposite faces of the board. The components on the two sides of the board communicate with each other by optical signals transmitted by transmission/reception means (18) through the vias. The components may comprise processor chips and cache memory chips. The vias may be formed by excimer laser ablation, using a mask.

Fig. 1.



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Fig. 1.



ELECTRONIC CIRCUIT ASSEMBLY

Background to the Invention

This invention relates to electronic circuit assemblies. More specifically, the invention is concerned with an electronic circuit assembly comprising a printed circuit board having electronic components mounted on both sides of the board.

A problem which arises with such an assembly is how to communicate signals between components on opposite sides of the board. One conventional way of doing this is by means of electrically conductive vias (eg plated through-holes) which extend between the two sides of the board. If many connections are required, many such vias must be provided, and it may be difficult to fit all these vias into the available area of the board. This problem is particularly acute in the case where it is required to connect a processing unit on one side of the board to a cache memory on the opposite side of the board. In this case, a large number of connections are required, corresponding to the width of the data/address bus between the processor and cache, and the path length of all the connections must be kept as short as possible to reduce signal propagation delays.

The object of the present invention is to provide a novel way of overcoming this problem.

Summary of the Invention

According to the invention there is provided an electronic circuit assembly comprising a printed circuit board having at least first and second electronic components mounted on opposite faces of the board, wherein the board has an optically transmissive via extending between the opposite faces of the board, and the first and second components communicate with each other by means of optical signals transmitted through said via.

Because of the potentially very high bandwidth of an optical signal, a single optical via can replace a large number of electrically conductive vias. Hence, it is possible, for example, to connect a processor unit to a cache using only a single optical via, thus avoiding the above-mentioned problems.

Brief Description of the Drawing

The drawing is a sectional elevation of an electronic circuit assembly embodying the invention.

Description of an Embodiment of the Invention

On electronic circuit assembly in accordance with the invention will now be described by way of example with reference to the accompanying drawing.

Referring to the drawing, the electronic circuit assembly comprises a multi-layer printed circuit board 10.

The board 10 has a number of optical vias 12 formed in it. Each optical via consists of a hole 5 microns in diameter, extending from one side of the board to the other. The vias

are preferably formed by excimer laser ablation, using a mask to define the shape of the hole.

A number of electronic components 14 are mounted on one side of the board, and a similar number of electronic components 16 are mounted on the other side of the board. Each pair of components 14, 16 are mounted at opposite ends of one of the optical vias 12. Each component includes an optical transmitter and an optical receiver (indicated jointly by the reference numeral 18). The transmitter produces an optical signal modulated by a data signal. The receiver receives a modulated optical signal and demodulates the signal to produce a data signal. Thus, it can be seen that each component 14 can communicate with the corresponding component 16 on the other side of the board by means of an optical data signal, through the optical via 12.

In this example, the components 14 may be processing unit chips, while the components 16 may be cache memory chips. In this case, the connection between the components 14, 16 through the optical vias provides a high speed, high bandwidth, connection between the processing units and the cache memories.

In another embodiment of the invention, all the components 14, 16 may be memory chips. In this case, the use of the optical vias allows a double sided store arrangement with reduced address line delays.

In the example described above, the optical connection is two-way. However, in some cases, only one-way communication is required between the two sides of the board, and so each component may have either an optical transmitter or an optical receiver.

CLAIMS

1. An electronic circuit assembly comprising a printed circuit board having at least first and second electronic components mounted on opposite faces of the board, wherein the board has an optically transmissive via extending between the opposite faces of the board, and the first and second components communicate with each other by means of optical signals transmitted through said via.
2. An assembly according to Claim 1 wherein said optically transmissive via comprises a hole formed by laser ablation.
3. An assembly according to Claim 1 or 2 wherein one of said components is a processing unit and the other of said components is a cache memory unit.
4. An assembly according to any preceding claim wherein each of said components includes an optical transmitter for generating a modulated optical signal and also an optical receiver for receiving a modulated optical signal.
5. An electronic circuit assembly substantially as hereinbefore described with reference to the accompanying drawing.

Relevant Technical Fields	Search Examiner S DAVIES
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(ii) Int Cl (Ed.5) H05K - 3/40, 3/42	
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications.	Documents considered relevant following a search in respect of Claims :- ALL
(ii) -	

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