

**FOR IMMEDIATE RELEASE**

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**mitsubishi electric announces the successful development of  
an uncooled direct-modulated dfb-ld for 10gb/s optical  
telecommunication. world's first operation at 120°c.**

**TOKYO, December 15, 2003** - Mitsubishi Electric Corporation (President & CEO: Tamotsu Nomakuchi) has successfully developed a direct-modulated 10Gb/s DFB-LD that will be used for optical telecommunications. This DFB has cleared the OC-192 mask criterion related to communication transmission quality and will satisfactorily transmit at 10Gb/s in conditions up to, and including, 120°C without a cooling element.

Adopting this uncooled DFB Laser enables the installation of a large capacity data communication network at low cost, with optical transmission capable of high speeds up to 10Gb/s. Furthermore, its low electric power consumption makes it ideal for an internet-type network such as the metro-network, which combines high speed initiation FTTH (Fiber To The Home) and intranet LAN (Local Area Network) with backbone lines.

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The optical transmitters with smaller size and lower power consumption will meet the strong demand of increasing internet-traffic, and the uncooled 10Gb/s direct-modulated DFB-LDs are the key devices for current and next generation optical transmitters such as XENPAK and XFP. Mitsubishi Electric Corporation has already released the uncooled DFB-LDs for 85°C operation, in which an InGaAsP active layer is adopted. Meeting the request for the smaller size transmitters with smaller size that can operate without a cooling element at higher temperatures was the obvious next step.

### Device Features

- (1) By applying an AlGaInAs active layer instead of a conventional InGaAsP active layer material, electrons in the active layer are confined. The efficiency of the light emission does not degrade at high temperatures, which allows the clear eye-opening for 10Gb/s telecommunications applications even at 120°C.
- (2) To obtain high-speed operation, the strong interaction of photons with electrons and holes in the active layer through a grating process with high optical reflectivity is necessary. For this purpose, using the deep grating close to the active layer is effective. Mitsubishi Electric developed new crystal growth techniques for burying the deep grating grooves flat by
- (3) a semiconductor layer of only 100nm thickness. An AlGaInAs active layer is successively formed on the previous semiconductor layer on the grating with no crystal defect. These techniques enable both high-speed operation and high reliability at high temperature.

### About Mitsubishi Electric

With over 80 years of experience in providing reliable, high-quality products to both corporate clients and general consumers all over the world, Mitsubishi Electric Corporation (TSE: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology,

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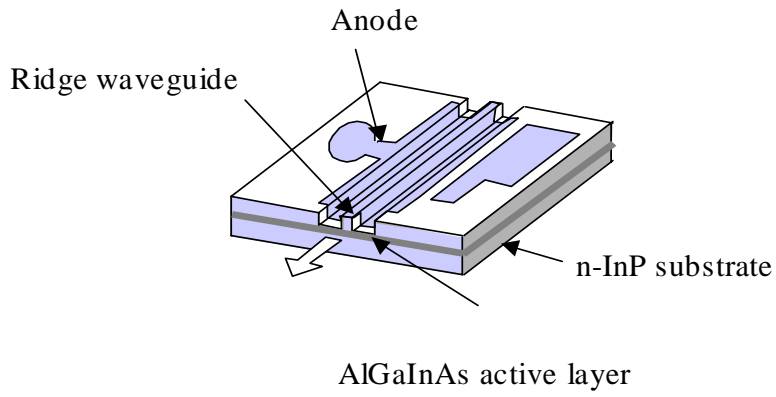
energy, transportation and building equipment. The company has operations in 35 countries and recorded consolidated group sales of 3,639 billion yen (US\$30.3 billion<sup>\*</sup>) in the year ended March 31, 2003.

For more information visit <http://global.mitsubishielectric.com>

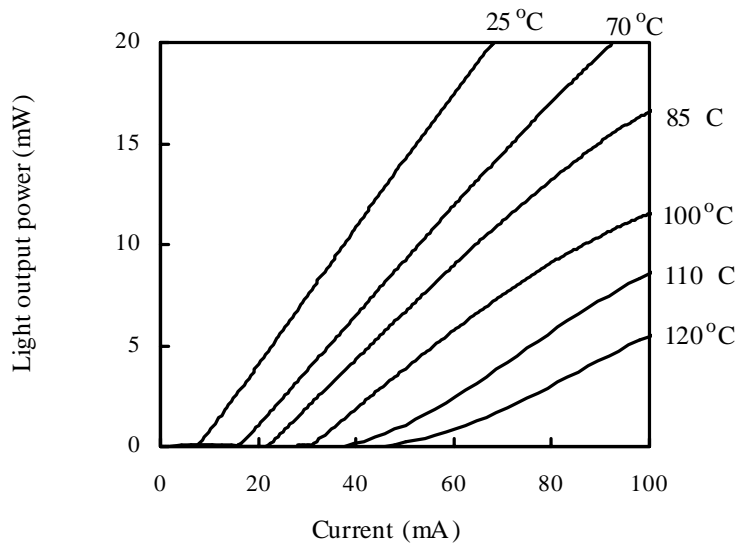
<sup>\*</sup>At an exchange rate of 120 yen to the US dollar, the rate given by the Tokyo Foreign Exchange Market on March 31, 2003.

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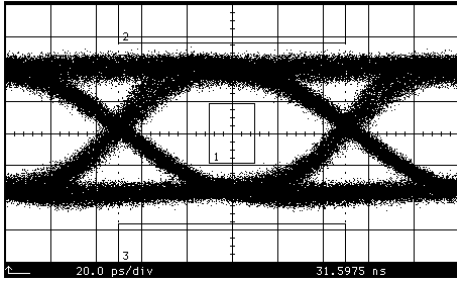
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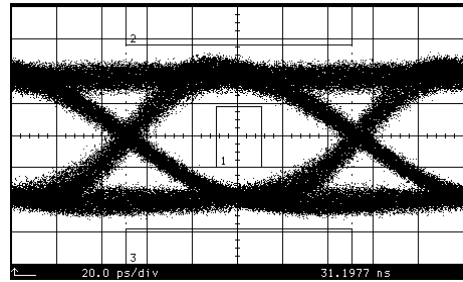
Schematic view of the LD



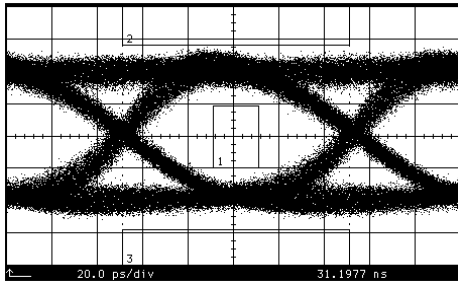
Light-Current Characteristics



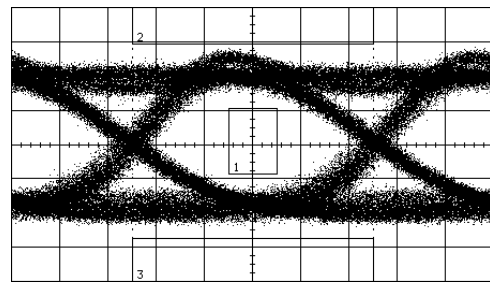
(a) 25°C



(b) 85°C



(c) 100°C



(d) 120°C

10GB/s eye diagrams

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### Glossary of Terms

10Gb/s:

The transmission speed of signals that can transfer 10 billion digits in a second, which is equivalent to transfer about 1.8 pieces of Compact Disks in a second.

DFB-LD:

DFB-LD is the abbreviation of “Distributed Feed-Back Laser Diode”. The grating is formed in the cavity of the laser diode, which feeds back the light with specified wavelength. The DFB-LD emits the monochromatic light, which is suitable for the light source of long distance optical communication.

XENPAK:

One of the de-fact standards of the optical transponders for 10Gb/s Ethernet based on IEEE 802.3ae.

XFP:

One of the de-fact standards of the optical transponders for 10Gb/s Ethernet, OC-192, and 10Gb/s fibre channel. Compared with XENPAK, XFP has advantageous about its small size and low consumption energy.

Active layer:

The layer where the light is produced in the semiconductor laser chip.

OC-192:

The standards of 10Gb/s telecom optical communication.

Electron confinement:

To emit the laser light, confining both of electrons and holes in thin active layer at high density is

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indispensable. At high temperature, electrons easily move outside the active layer by thermal effect, which degrades the efficiency of laser diodes in the case of InGaAsP active layer.

Cavity:

The light reflection mechanism, which confine the light in the active layer.

FTTH:

The abbreviation of “Fiber To The Home”.

The data transfer method of transmitting signals using optical fiber between the base station and the home.

It enables the transmission speed of maximum 100Mb/s.

LAN:

The abbreviation of “Local Area Network”. The communication networks mainly used in the office. The transmission speeds from 10Mb/s to 10Gb/s are mainly used. The metallic cables are used for lower speeds, and optical fibers are used for higher speeds.

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