

MITSUBISHI LASER DIODES
ML9XX12 SERIES

InGaAsP—MQW—DFB LASER DIODES

**TYPE
NAME**

ML99212

DESCRIPTION

ML9XX12 series are MQW*—DFB** laser diodes emitting light beam around 1550nm.

They are well suited for light source in longdistance digital transmission systems.

The ML99212 are specially designed for fiber modules and mount on flat open packages.

Rear output can be used for automatic power control of the laser.

*MQW : Multiple Quantum Well

**DFB: Distributed Feedback

FEATURES

- Well suitable for 2.5Gb/s digital transmission with 1.3 μ m normal fiber 100km
- Low threshold current (typical 20mA)
- Stable single transverse mode oscillation
- High-side mode suppression ratio (typical 40dB)
- High speed pulse response (rise/fall time typical 0.1nsec)
- Small spectrum width (typical 0.1nm) (20dB down)

APPLICATION

Long-distance (100km) /High bit-rate (2.5Gb/s) digital transmission system

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Conditions | Ratings | Unit |
|------------------|-------------------------------|------------|----------|------|
| P _o | Light output power | CW | 12 | mW |
| V _{RL} | Reverse Voltage (Laser diode) | — | 2 | V |
| T _c | Case temperature | — | +20~+30 | °C |
| T _{stg} | Storage temperature | — | -40~+100 | °C |

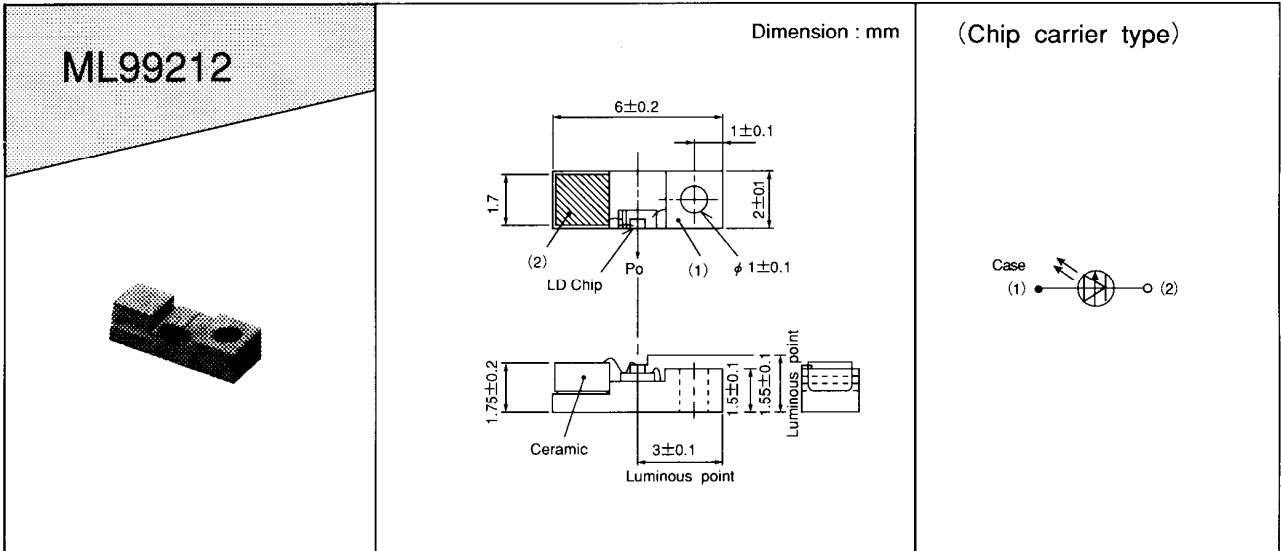
ELECTRICAL/OPTICAL CHARACTERISTICS (T_c = 25°C)

| Symbol | Parameter | Test conditions | Limits | | | Unit |
|---------------------------------|---------------------------------------|---|--------|------|------|-------|
| | | | Min. | Typ. | Max. | |
| I _{th} | Threshold current | CW | — | 20 | 40 | mA |
| I _{OP} | Operating current | CW, P _o = 10mW | — | 60 | 90 | mA |
| V _{OP} | Operating voltage | CW, P _o = 10mW | — | 1.2 | 1.8 | V |
| η | Slope efficiency | CW, P _o = 10mW | — | 0.25 | — | mW/mA |
| λ_P | Peak wavelength | CW, P _o = 10mW | 1530 | 1550 | 1570 | nm |
| $\theta_{//}$ | Beam divergence angle (parallel) | CW, P _o = 10mW | — | 30 | 45 | deg. |
| θ_{\perp} | Beam divergence angle (perpendicular) | CW, P _o = 10mW | — | 40 | 50 | deg. |
| P _m | Monitoring output | CW, P _o = 10mW | — | 0.5 | — | mW |
| f _c | Cutoff frequency | CW, P _o = 10mW, -3dB | 3.0 | 4.5 | — | GHz |
| f _r | Resonance frequency | extinction ratio = 10%, modulation current = 40mA | 8 | 12 | — | GHz |
| t _r , t _f | Rise and fall time | extinction ratio = 10%, modulation current = 40mA, 10~90% | — | 0.1 | 0.2 | ns |
| SMSR | Side mode suppression ratio | extinction ratio = 10%, modulation current 40mA | 30 | 40 | — | dB |
| $\Delta\lambda_{-20}$ | Spectrum width (-20dB full width) | 2.48832Gb/s, NRZ | — | 0.1 | — | nm |
| P _P | Power penalty | extinction ratio = 10%, modulation current = 40mA 2.48832Gb/s, NRZ 1.3 μ m normal fiber 100km @BER = 10 ⁻¹⁰ | — | 0.5 | — | dB |

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OUTLINE DRAWINGS



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TYPICAL CHARACTERISTICS

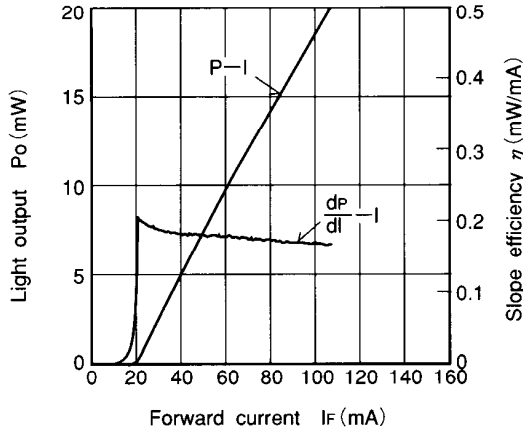


Fig.1 Light output vs. forward current

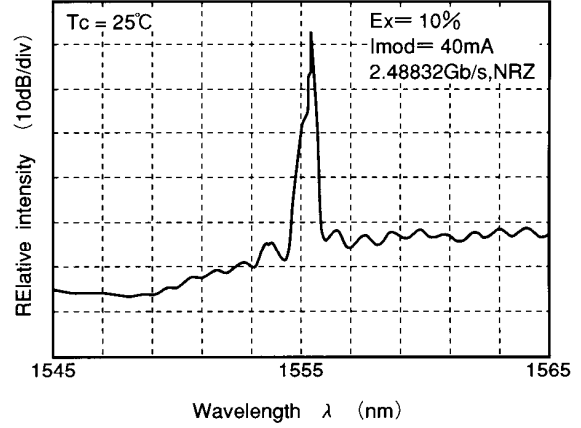


Fig.2 Spectrum under 2.5Gb/s modulation

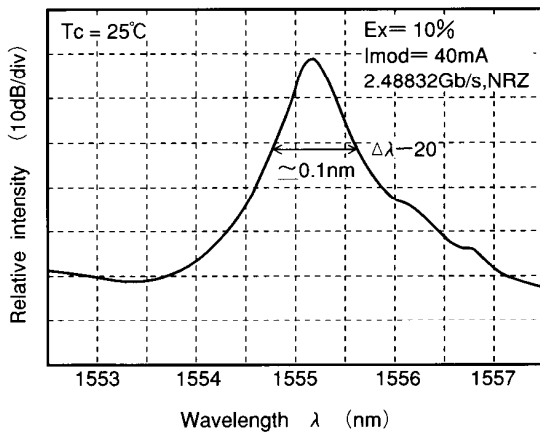


Fig.3 Spectrum width under 2.5Gb/s modulation

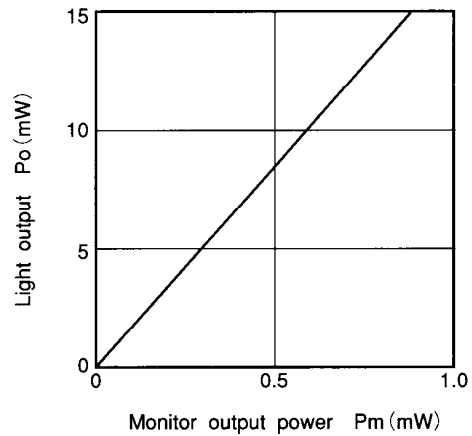


Fig.4 Light output vs. monitoring output power

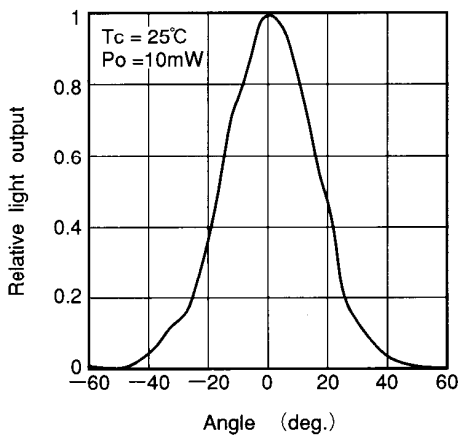


Fig.5-1 Far field pattern $\theta //$

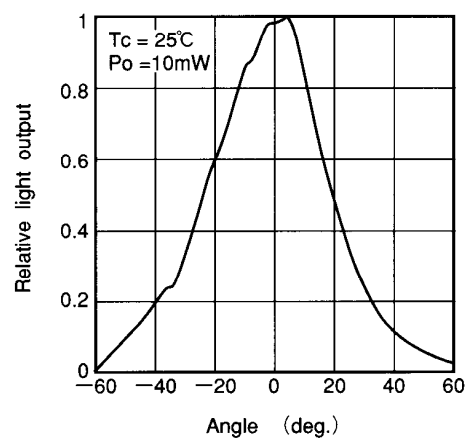


Fig.5-2 Far field pattern $\theta \perp$

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TYPICAL CHARACTERISTICS (Cont.)

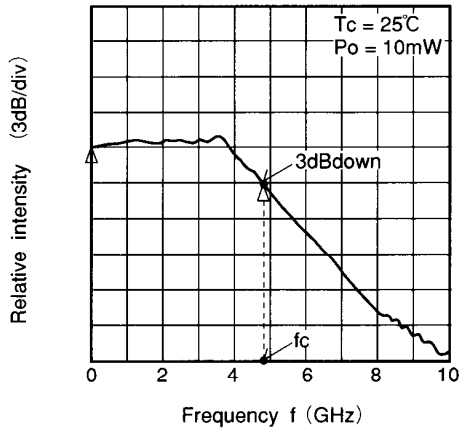


Fig.6 Frequency characteristics

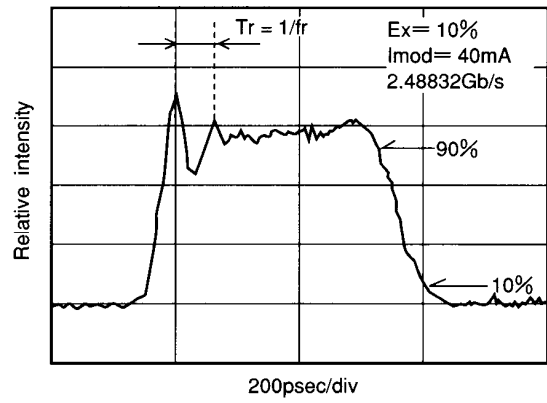


Fig.7 Pulse response / Resonance frequency

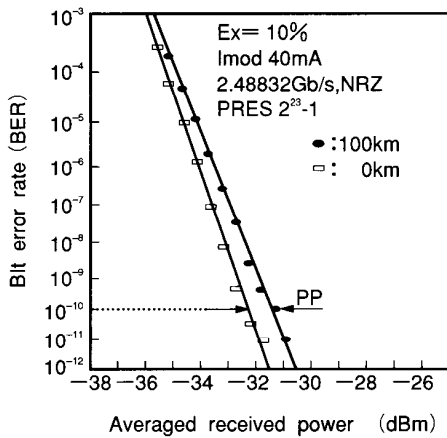


Fig.8 Transmission characteristics