

ML9XX31 SERIES

InGaAsP DFB-LASER DIODE WITH EA MODULATOR

Notice: Some parametric limits are subject to change.

**TYPE
NAME**

ML9SM31

DESCRIPTION

ML9XX31 series are DFB (Distributed Feedback) laser diodes with a monolithically integrated EA modulator, suitable light source for 10Gbps or 2.5Gbps application (Single channel / DWDM).

Available wavelengths are from 1530nm to 1565nm with 0.8nm spacing.

ML9SM31 is supplied with the chip-on-carrier type package.

FEATURES

- Available distance
ML9SM31-01 series : 50km(Max) at 10Gbps
ML9SM31-02 series : 700km(Max) at 2.5Gbps
- High extinction ratio (Min. 11dB at 2.5Gbps, Typ. 11dB at 10Gbps)
- High - side mode suppression ratio (Typ. 40dB)
- High speed response (Typ. 30psec)

APPLICATION

2.5Gbps long-haul transmission system
10Gbps transmission system

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Conditions | Ratings | Unit |
|----------|-------------------------------|------------|-------------|------|
| I_F | Forward current (Laser diode) | CW | 200 | mA |
| V_{RL} | Reverse voltage (Laser diode) | - | 2 | V |
| V_{EA} | Reverse voltage (Modulator) | - | -3 | V |
| Tc | Case temperature | - | +15 to +35 | degC |
| Tstg | Storage temperature | - | -40 to +100 | degC |

ELECTRICAL/OPTICAL CHARACTERISTICS (Tc=25degC)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|------------------|---------------------------------------|---------------------|------|-----------|------|------|
| Ith | Threshold current | CW, Vmod=0V | --- | 10 | 30 | mA |
| Iop | Operation current | CW, Po=5mW, Vmod=0V | --- | 60 | 90 | mA |
| Vop | Operating voltage | CW, Po=5mW, Vmod=0V | --- | 1.2 | 1.8 | V |
| λ_p | Peak wavelength | CW, If>Iop, Vmod=0V | -0.4 | code list | +0.4 | nm |
| $\theta_{//}$ | Beam divergence angle (parallel) | CW, Po=5mW, Vmod=0V | --- | 30 | --- | deg. |
| θ_{\perp} | Beam divergence angle (perpendicular) | CW, Po=5mW, Vmod=0V | --- | 45 | --- | deg. |
| Pm | Monitoring output power | CW, Po=5mW, Vmod=0V | --- | 1.0 | --- | mW |

ML9SM31-01 series for 10Gbps

| | | | | | | |
|-------|------------------------------|---|-----|-----|-----|------|
| fc | Cut off frequency | CW, If>Iop, Vmod=-1V | 10 | 14 | --- | GHz |
| tr,tf | Rise and fall time (10%-90%) | 9.95328Gbps, NRZ, PRBS 2 ²³ -1 | --- | 30 | 40 | psec |
| SMSR | Side mode suppression ratio | If>Iop, Vpp=2.5V, | 35 | 40 | --- | dB |
| Ex | Extinction ratio | Voffset=0 to -1.0V | 10 | 11 | --- | dB |
| Pp | Dispersion penalty | ditto SMF 50km @BER=10 ⁻¹⁰ | --- | --- | 2.0 | dB |

ML9SM31-02 series for 2.5Gbps

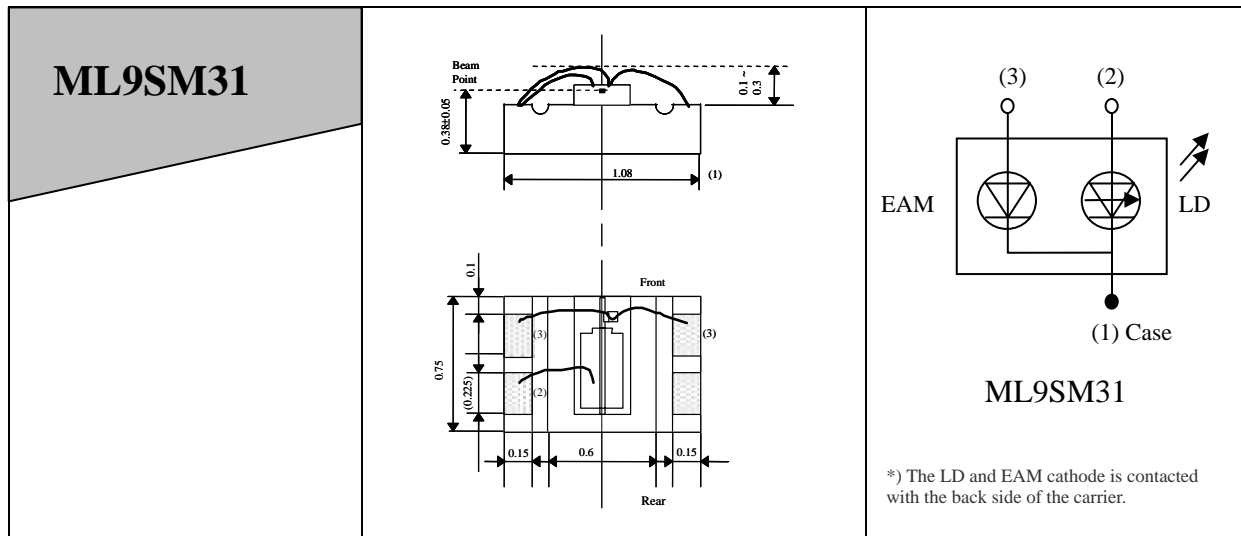
| | | | | | | |
|-------|------------------------------|---|-----|-----|-----|------|
| fc | Cut off frequency | CW, If>Iop, Vmod=-1V | 4 | --- | --- | GHz |
| tr,tf | Rise and fall time (10%-90%) | 2.48832Gbps, NRZ, PRBS 2 ²³ -1 | --- | --- | 120 | psec |
| SMSR | Side mode suppression ratio | If>Iop, Vpp=2.5V, | 35 | 40 | --- | dB |
| Ex | Extinction ratio | Voffset=0 to -1.0V | 11 | --- | --- | dB |
| Pp | Dispersion penalty | ditto SMF 700km @BER=10 ⁻¹⁰ | --- | --- | 2.0 | dB |

MITSUBISHI LASER DIODES
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OUTLINE DRAWINGS



Wavelength code list

| Code | Wavelength(nm) |
|------|----------------|
| 00 | 1530 to 1565 |

← non WDM (single channel)

| Code | Wavelength(nm) | Code | Wavelength(nm) |
|------|----------------|------|----------------|
| 01 | 1529.55 | 24 | 1547.72 |
| 02 | 1530.33 | 25 | 1548.51 |
| 03 | 1531.12 | 26 | 1549.32 |
| 04 | 1531.90 | 27 | 1550.12 |
| 05 | 1532.68 | 28 | 1550.92 |
| 06 | 1533.47 | 29 | 1551.72 |
| 07 | 1534.25 | 30 | 1552.52 |
| 08 | 1535.04 | 31 | 1553.33 |
| 09 | 1535.82 | 32 | 1554.13 |
| 10 | 1536.61 | 33 | 1554.94 |
| 11 | 1537.40 | 34 | 1555.75 |
| 12 | 1538.19 | 35 | 1556.55 |
| 13 | 1538.98 | 36 | 1557.36 |
| 14 | 1539.77 | 37 | 1558.17 |
| 15 | 1540.56 | 38 | 1558.98 |
| 16 | 1541.35 | 39 | 1559.79 |
| 17 | 1542.14 | 40 | 1560.61 |
| 18 | 1542.94 | 41 | 1561.42 |
| 19 | 1543.73 | 42 | 1562.23 |
| 20 | 1544.53 | 43 | 1563.05 |
| 21 | 1545.32 | 44 | 1563.86 |
| 22 | 1546.12 | 45 | 1564.68 |
| 23 | 1546.92 | 46 | 1565.50 |

Ordering information

