

Specific Wavelength Laser Source Module Spec

The WLS-XXXXX2110-01 DFB laser modules are designed for forward-path CATV applications, especially digital transmission using Quadrature Amplitude Modulation (QAM). The modules are designed to incorporate high output power while maintaining high linearity. The devices feature standard pin assignments (compatible with OC-48).

These devices offer excellent performance in directly-modulation QAM transmission, offering considerable cost savings over externally-modulated solutions. The combination of high performance and very reasonable price make these modules the most cost-effective CATV transmitter solutions in the industry.

Applications:

- 1550-nm broadcast and point-to-point applications
- Digital CATV transmission
- Sensing
- Testing system

Features:

- Meets GR 468 reliability specifications

| Product PN | Description |
|------------------|---|
| WLS-XXXXX2110-01 | WSLS with DFB LD chip, wavelength XXXX.XX±0.20nm, power ≥8mW, 14-pin butterfly package built-in optical isolator and thermoelectric cooler 1.0±0.1m polarization-maintaining optical fiber pigtail with 900um loose tube, No connector. |

1. Performance Specifications

1.1 Absolute Maximum Ratings

| Parameter | Symbol | Condition | Min. | Max. | Unit |
|----------------------------|------------------|--|------|------|------|
| Operating Case Temperature | T _c | I=I _{op} | -20 | 65 | °C |
| Storage Temperature | T _{stg} | -- | -40 | 85 | °C |
| Laser Forward Current | I _f | -- | -- | 120 | mA |
| Laser Reverse Bias | V _r | -- | -- | 2 | V |
| Photodiode Reverse Bias | V _{rpd} | -- | -- | 10 | V |
| TEC Current | I _{tec} | -20 °C < T _c < +65 °C, Top=25 °C I _f =100 mA | | 1.5 | A |

1.2 Electrical and Optical Characteristics

Parameters are over operating temperature range unless otherwise noted.

| Parameters | Symbol | Test Conditions | Min | Typ | Max | Unit |
|-----------------------------|-----------------|--|------|-----|------|--------|
| Center Wavelength* | λ _c | P _L = P _o , CW, T _{set} = 20C - 35C | 1530 | -- | 1560 | nm |
| Optical Output Power | P _o | CW, T _L = T _{set} | 8 | -- | -- | mW |
| Optical Isolation | I _s | T=25 °C | 30 | -- | -- | dB |
| Side-mode Suppression Ratio | SMSR | P _L = P _o , | 30 | -- | -- | dB |
| Linewidth | FWHM | P _L = P _o , CW | -- | 6 | 10 | MHz |
| Chirp | Δλ/Δf | P _L = P _o , 500 MHz | 40 | -- | 120 | MHz/mA |
| Threshold Current | I _{th} | T _L =25 °C | -- | 15 | 20 | mA |
| Operating Current | I _{op} | P _L = P _o , | -- | -- | 120 | mA |
| Forward Voltage | V _F | P _L = P _o , | | 1.2 | 1.9 | V |

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| | | | | | | |
|----------------------------|-----------|---|------|------|------|--------------------|
| Monitor Current | I_{mon} | $V_{rpd}=5\text{ V}$ | 9 | -- | 150 | $\mu\text{ A/mW}$ |
| Monitor Dark Current | I_D | $V_{rpd}=5\text{ V}$ | -- | -- | 200 | nA |
| Operating Case Temperature | T | | -20 | -- | 65 | $^{\circ}\text{C}$ |
| Tracking Error | γ | $I_{mon}=\text{const}, \gamma=10 \log (P_o/10\text{ mW})$ [dB] | -0.5 | -- | 0.5 | dB |
| Thermistor Resistance | R_t | $T=25\text{ }^{\circ}\text{C}$ | 9.5 | -- | 10.5 | K Ω |
| Thermistor B Constant | B | $T=25\text{ }^{\circ}\text{C}$ | -- | 3900 | -- | K |
| TEC Current | I_c | $\Delta T=40\text{ }^{\circ}\text{C}$ | -- | -- | 1.5 | A |
| TEC Voltage | V_c | $\Delta T=40\text{ }^{\circ}\text{C}$ | -- | -- | 2.0 | V |

*See available wavelengths from Ordering Options. DWDM wavelength set by laser sub-mount temperature.

1.3 RF Characteristics

| Parameter | Symbol | Test Conditions | Min. | Typical | Max. | Unit |
|---------------------------------------|------------|--|------|-----------|------|----------|
| Input impedance | Z_{IN} | nominal | | 25 | | Ω |
| Frequency Range | F | -- | 45 | - | 3000 | MHz |
| Frequency Response | $ S_{21} $ | $f=f_{lop}$ 45 MHz-870 MHz $T=25\text{ }^{\circ}\text{C}$ | -- | ± 0.5 | -- | dB |
| | | $f=f_{lop}$ 45 MHz-3000 MHz $T=25\text{ }^{\circ}\text{C}$ | -- | ± 1.0 | -- | |
| RF return loss | S_{11} | 50 – 870 MHz, $P=P_F$, @ 50 Ω , | 6 | 7 | | dB |
| Relative Intensity Noise | RIN | CW, $P_L = P_o$, Note 1 | -- | -- | -155 | dB/Hz |
| 2 nd Order Intermodulation | IMD2 | Note 2, 42 MHz, @ f_2-f_1 | -- | -- | -44 | dBc |
| 3 rd Order Intermodulation | IMD3 | Note 2, 511.25 MHz, @ $2f_1-f_2$ | -- | -- | -53 | dBc |

Note 1: Test condition: $P_L = P_o$, $f = 500\text{ MHz}$, Optical reflection <-40 dB, 0 km fiber.

Note 2: Test condition: $P_o \geq 5\text{ mW}$, 2 unmodulated carriers ($f_1=553.25$, $f_2=595.25$), 35% OMI/ carrier, 50 km zero dispersion single mode fiber, optical reflection <-40 dB.

2. Pin Information & Electrical Schematics:

| | |
|----|-------------------------------|
| 1 | Thermistor |
| 2 | Thermistor |
| 3 | DC Laser Bias (-) |
| 4 | MPD Anode (-) |
| 5 | MPD Cathode (+) |
| 6 | Thermoelectric Cooler (+) |
| 7 | Thermoelectric Cooler (-) |
| 8 | Case Ground |
| 9 | Case Ground |
| 10 | Case Ground |
| 11 | Laser Common (+), Case Ground |
| 12 | Laser Modulation (-) |
| 13 | Laser Common (+), Case Ground |
| 14 | Case Ground |

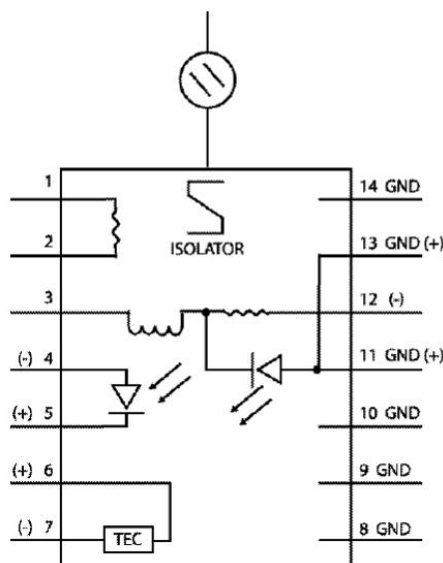
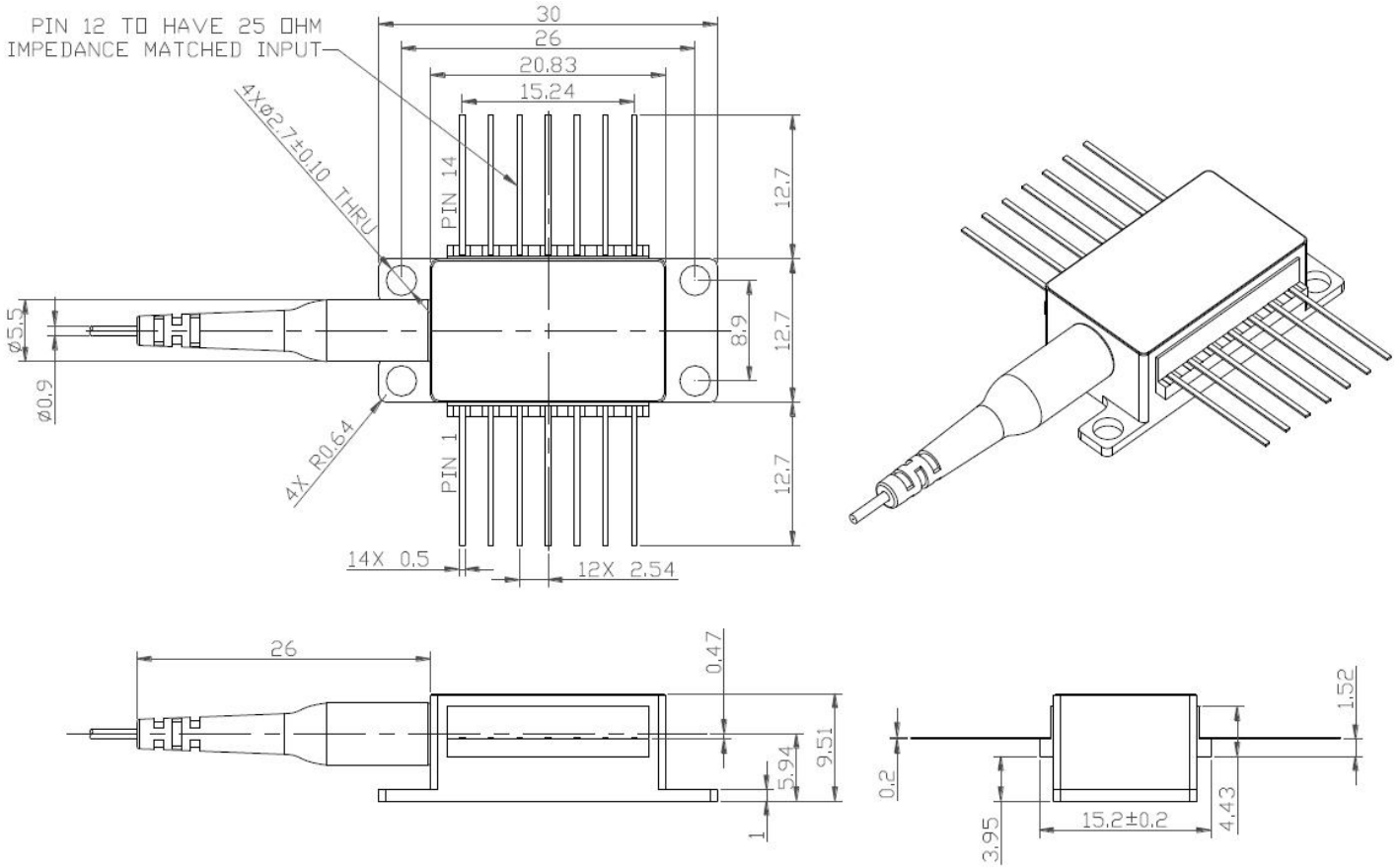


Figure 1. Laser Schematic

3. Outline Diagram:

Dimensions are in millimeters



4. Test Report:

Test report will be attached with each product. The following characteristic test data should be included :

-Optical Output Power, Center Wavelength, P-I curve, Pin Assignments.

5. Packaging:

Black vacuumize anti-static plastic package.

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ORDERING INFORMATION:

| Ordering Option* | Frequency (THz) | Power (mW) | Wavelength (nm) |
|------------------|-----------------|------------|-----------------|
| WLS-C19102110-01 | 191.9 | 10 | 1562.23 |
| WLS-C20102110-01 | 192.0 | 10 | 1561.42 |
| WLS-C21102110-01 | 192.1 | 10 | 1560.61 |
| WLS-C22102110-01 | 192.2 | 10 | 1559.79 |
| WLS-C23102110-01 | 192.3 | 10 | 1558.98 |
| WLS-C24102110-01 | 192.4 | 10 | 1558.17 |
| WLS-C25102110-01 | 192.5 | 10 | 1557.36 |
| WLS-C26102110-01 | 192.6 | 10 | 1556.55 |
| WLS-C27102110-01 | 192.7 | 10 | 1555.75 |
| WLS-C28102110-01 | 192.8 | 10 | 1554.94 |
| WLS-C29102110-01 | 192.9 | 10 | 1554.13 |
| WLS-C30102110-01 | 193.0 | 10 | 1553.33 |
| WLS-C31102110-01 | 193.1 | 10 | 1552.52 |
| WLS-C32102110-01 | 193.2 | 10 | 1551.72 |
| WLS-C33102110-01 | 193.3 | 10 | 1550.92 |
| WLS-C34102110-01 | 193.4 | 10 | 1550.12 |
| WLS-C35102110-01 | 193.5 | 10 | 1549.32 |
| WLS-C36102110-01 | 193.6 | 10 | 1548.51 |
| WLS-C37102110-01 | 193.7 | 10 | 1547.72 |
| WLS-C38102110-01 | 193.8 | 10 | 1546.92 |
| WLS-C39102110-01 | 193.9 | 10 | 1546.12 |
| WLS-C40102110-01 | 194.0 | 10 | 1545.32 |
| WLS-C41102110-01 | 194.1 | 10 | 1544.53 |
| WLS-C42102110-01 | 194.2 | 10 | 1543.73 |
| WLS-C43102110-01 | 194.3 | 10 | 1542.94 |
| WLS-C44102110-01 | 194.4 | 10 | 1542.14 |
| WLS-C45102110-01 | 194.5 | 10 | 1541.35 |
| WLS-C46102110-01 | 194.6 | 10 | 1540.56 |
| WLS-C47102110-01 | 194.7 | 10 | 1539.77 |
| WLS-C48102110-01 | 194.8 | 10 | 1538.98 |
| WLS-C49102110-01 | 194.9 | 10 | 1538.19 |
| WLS-C50102110-01 | 195.0 | 10 | 1537.40 |
| WLS-C51102110-01 | 195.1 | 10 | 1536.61 |
| WLS-C52102110-01 | 195.2 | 10 | 1535.82 |
| WLS-C53102110-01 | 195.3 | 10 | 1535.04 |
| WLS-C54102110-01 | 195.4 | 10 | 1534.25 |
| WLS-C55102110-01 | 195.5 | 10 | 1533.47 |
| WLS-C56102110-01 | 195.6 | 10 | 1532.68 |
| WLS-C57102110-01 | 195.7 | 10 | 1531.90 |
| WLS-C58102110-01 | 195.8 | 10 | 1531.12 |
| WLS-C59102110-01 | 195.9 | 10 | 1530.33 |
| WLS-C60102110-01 | 196.0 | 10 | 1529.55 |
| WLS-C61102110-01 | 196.1 | 10 | 1528.77 |
| WLS-C62102110-01 | 196.2 | 10 | 1527.99 |

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| | | | |
|------------------|-------|---|---------|
| WLS-C19082110-01 | 191.9 | 8 | 1562.23 |
| WLS-C20082110-01 | 192.0 | 8 | 1561.42 |
| WLS-C21082110-01 | 192.1 | 8 | 1560.61 |
| WLS-C22082110-01 | 192.2 | 8 | 1559.79 |
| WLS-C23082110-01 | 192.3 | 8 | 1558.98 |
| WLS-C24082110-01 | 192.4 | 8 | 1558.17 |
| WLS-C25082110-01 | 192.5 | 8 | 1557.36 |
| WLS-C26082110-01 | 192.6 | 8 | 1556.55 |
| WLS-C27082110-01 | 192.7 | 8 | 1555.75 |
| WLS-C28082110-01 | 192.8 | 8 | 1554.94 |
| WLS-C29082110-01 | 192.9 | 8 | 1554.13 |
| WLS-C30082110-01 | 193.0 | 8 | 1553.33 |
| WLS-C31082110-01 | 193.1 | 8 | 1552.52 |
| WLS-C32082110-01 | 193.2 | 8 | 1551.72 |
| WLS-C33082110-01 | 193.3 | 8 | 1550.92 |
| WLS-C34082110-01 | 193.4 | 8 | 1550.12 |
| WLS-C35082110-01 | 193.5 | 8 | 1549.32 |
| WLS-C36082110-01 | 193.6 | 8 | 1548.51 |
| WLS-C37082110-01 | 193.7 | 8 | 1547.72 |
| WLS-C38082110-01 | 193.8 | 8 | 1546.92 |
| WLS-C39082110-01 | 193.9 | 8 | 1546.12 |
| WLS-C40082110-01 | 194.0 | 8 | 1545.32 |
| WLS-C41082110-01 | 194.1 | 8 | 1544.53 |
| WLS-C42082110-01 | 194.2 | 8 | 1543.73 |
| WLS-C43082110-01 | 194.3 | 8 | 1542.94 |
| WLS-C44082110-01 | 194.4 | 8 | 1542.14 |
| WLS-C45082110-01 | 194.5 | 8 | 1541.35 |
| WLS-C46082110-01 | 194.6 | 8 | 1540.56 |
| WLS-C47082110-01 | 194.7 | 8 | 1539.77 |
| WLS-C48082110-01 | 194.8 | 8 | 1538.98 |
| WLS-C49082110-01 | 194.9 | 8 | 1538.19 |
| WLS-C50082110-01 | 195.0 | 8 | 1537.40 |
| WLS-C51082110-01 | 195.1 | 8 | 1536.61 |
| WLS-C52082110-01 | 195.2 | 8 | 1535.82 |
| WLS-C53082110-01 | 195.3 | 8 | 1535.04 |
| WLS-C54082110-01 | 195.4 | 8 | 1534.25 |
| WLS-C55082110-01 | 195.5 | 8 | 1533.47 |
| WLS-C56082110-01 | 195.6 | 8 | 1532.68 |
| WLS-C57082110-01 | 195.7 | 8 | 1531.90 |
| WLS-C58082110-01 | 195.8 | 8 | 1531.12 |
| WLS-C59082110-01 | 195.9 | 8 | 1530.33 |
| WLS-C60082110-01 | 196.0 | 8 | 1529.55 |
| WLS-C61082110-01 | 196.1 | 8 | 1528.77 |
| WLS-C62082110-01 | 196.2 | 8 | 1527.99 |

* Please consult factory for wavelength availability before ordering

* Optical connector: LC/SC/ST/FC/APC ; Etc

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