# Dual Mode 30MHz Modulation Laser Controller

## Specifications

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|---|---|
| Drive current range: | 0 to 120mA |
| Current output accuracy: | ±2% |
| Current ripple noise: | ≤0.01% (RMS) and <0.1% (peak-to-peak) DC to 2KHz. |
| Current adjustable limit: | 0 to 120mA |
| Driving mode: | Constant current and constant power |
| Temperature coefficient: | ≤ ±100ppm/°C for power mode, ≤ ±250ppm/°C for current mode. |
| Operating temperature: | −10°C to 65°C |
| Storage temperature: | −40°C to 85°C |
| PD feedback current: | 0.02mA to 1.5mA, 0.3mA typical |
| Peak power set voltage: | 0V to 2V |
| Peak current set voltage: | 0V to 2V |
| Modulation input voltage: | 0V to 2V (open circuit voltage)* |
| Modulation input impedance: | 50Ω |
| Modulation bandwidth: | DC to 30MHz (±1dB) |
| Power supply voltage: | 5V ± 10% |
| Power supply current: | <140mA |
| Laser diode type supported: | Case = laser diode cathode and photo diode anode |
| Packaging: | 25mm x 20mm PCB |

\* The output DC and AC impedance of the modulation signal source should be 50Ω.

**Pin Descriptions** (See Figure 1 and 2 for laser controller ATLD201V1 views)

**J1: Signal Source Input.** The internal conductor of the RG174 coaxial cable is for connecting to the signal source, the cable shield is for connecting the ground.

**J2: Power Supply Input.**

**Pin 1, GND,** power ground.

**Pin2, VPS,** 5V power input.

**J3: Monitor and Programming Signals.**

**Pin 1, LIO,** laser current output, analog output.

**Pin 2, 2VR,** voltage reference, 2V, analog output.

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**Pin 3, LIS,** laser current limit set voltage, both analog input and output.

**Pin 4, GND,** signal ground.

**Pin 5, LPGD,** loop good indication, analog output.

**Pin 6, SDN**, shut down, digital input.

**Operation**

1. **Power up.** The laser controller ATLD201V1 circuit board is shown in Figure 1 and 2. Connect the ATLD201V1 according to Figure 3. Do not insert the laser diode yet.

2. **Set current limit.** Look up the datasheet of the laser diode and determine the maximum current limit needs to be set. Setting the current limit to too high a value, the laser diode will not be protected properly; setting the limit to too low a value will cause the laser controller to work under constant current mode, thus losing the power modulation function. It would be wise to set the value to 1.1 times of the maximum operating current under worst conditions. For example, at the highest temperature and highest output power, the maximum current of the laser will be 100mA, set the current limit to 110mA then. This is the way to set the limit: connect a volt meter between ground (J3 pin 4) and LIS (J3 pin 3) and adjust W2 according to this formula: VP3 = 15.8*Ilim, VP4 is the voltage measured, Ilim is the current limit value to be set. For example, to set Ilim = 0.1A, VP4 = 15.8*0.1 = 1.58V.

3. **Plug in the laser diode.** Turn of the power supply and plug in the laser diode. Make sure the whole operation of this step is ESD protected.

4. **Set maximum optical output power.** Look up the datasheet of the laser diode and determine the maximum optical power. Adjust W1, measure the laser optical output power by using an optical power meter, till the maximum power is achieved. Make sure that all the laser beam is coupled into the optical power meter receiving device. At the same time, monitor LPGD (J3 pin 5), make sure that this voltage is >3V all the time. If this voltage falls below 3V, it means the laser controller is working under the current mode. When this happens, there are several reasons: A. the laser optical output power is not completely coupled into the optical power meter so that the laser power is set to a too high value on W2. B. The current limit is set to a too low value. C. The laser diode is bad.
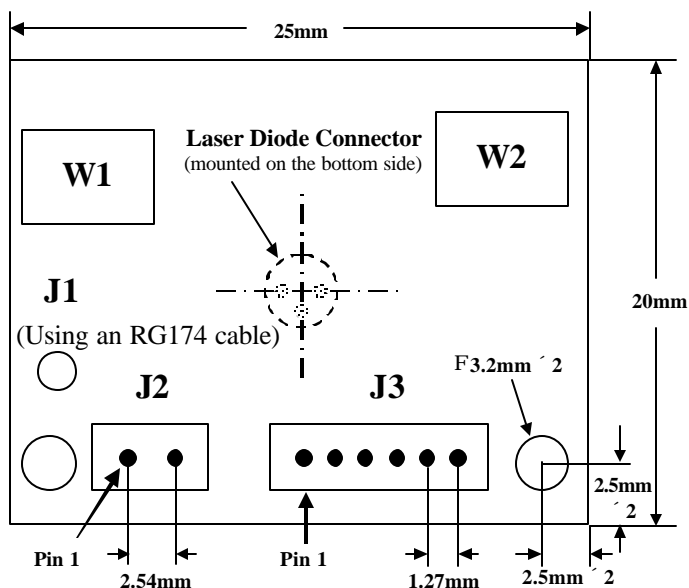
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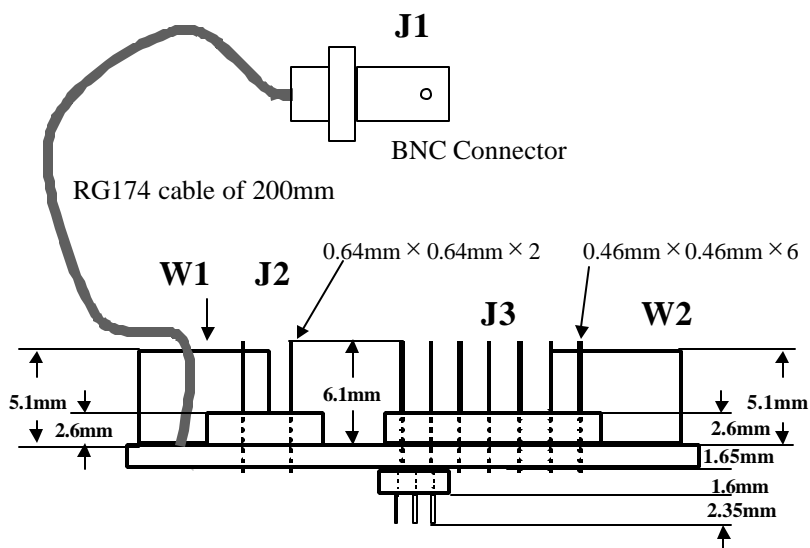Figure 1 Top View of ATLD201V1



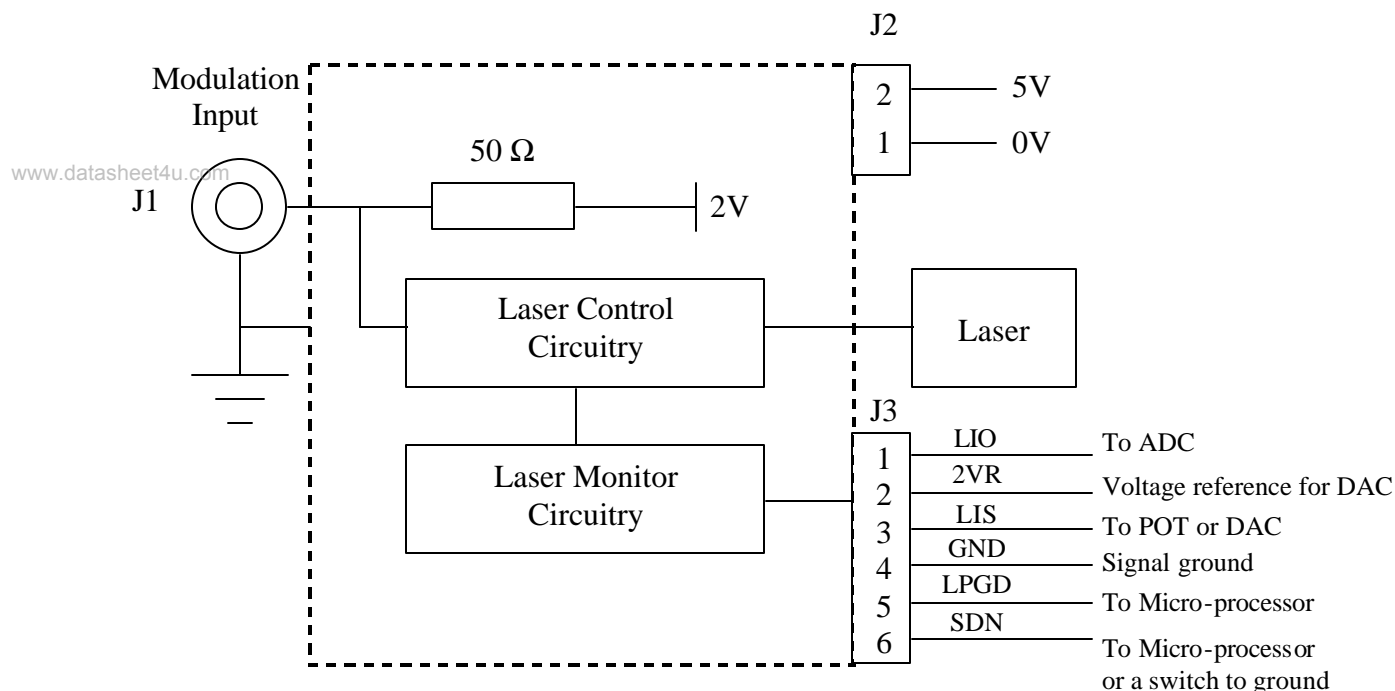Figure 2. Bottom End View of ATLD201V1

Figure 3. Internal Circuits and External Connections for ATLD201V1

5.  **Set up and Connect the Modulation Signal Source.** The modulation signal has to be between 0V to 2V and the output DC and AC impedance has to be 50Ω. Set up the modulation signal to the proper value first and then connect to J1 of ATLD201V1. When the input signal is 0V, it will generate a 1V voltage at the input pin (J1) and the output optical power is 0; when the input signal is at 2V, it will generate a 2V voltage at the input pin and the output optical power is at its maximum value. Leaving J1 unconnected will result in the input pin voltage to be at 2V and the output optical power to be at its maximum value. See Figure 3 for the internal connection of J1.

6.  **Monitor the laser current.** The ATLD201V1 comes with a current monitor circuit. Use voltage meter or a ADC to monitor the laser current by measuring the voltage at LIO (J3 pin 1). The formula is: $LI = LIO/20$, LI is the laser current, LIO is the voltage at LIO (J2 pin 1). For example, when LIO is 1V, LI $= 1/20 = 0.05A = 50mA$.

7.  **Monitor the control mode.** The ATLD201V1 has two control modes: constant current and constant power. Use a volt meter or ADC to monitor the control mode by measuring the voltage at LPGD (J3 pin 5). When this pin has a voltage of >3V, the controller is working under constant power mode, when this pin has a voltage of <3V, the controller is under constant current mode.

8.  **Shut down the controller.** The ATLD201V1 can be shut down by pulling the shut down pin SDN (J3 pin 6). This pin has an internal 100KΩ pull-up resistor, a shunt capacitor of 10nF, and a negative logic: SDN = 0 (<0.8V) turns the controller off; SDN = 1 (>1.8V) turns the controller on.

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