

# Cooling Capacity of LDT-53500 Laser Diode Thermoelectric Chillers

### PURPOSE

This technical note describes the maximum cooling capacity for LDT-53520 (200W) and LDT-53540 (375W) Laser Diode Thermoelectric Chillers using recommended coolants.

#### BACKGROUND

The LDT-53500 Series of Laser Diode Thermoelectric Chillers use recirculating fluid to cool laser diodes mounted on either an ILX Lightwave mount or other cold plate. The chillers have a water to air thermoelectric (TEC) heat exchanger which can heat or cool fluid between -5°C to 45°C. Both chillers have an internal microprocessor which uses PID control to maintain the coolant temperature at set point. The recommended cooling fluids for the LDT-53500 series are distilled water, distilled water with up to 30% isopropyl alcohol (IPA), and distilled water with up to 30% propylene glycol (PG).

## **MEASUREMENT SETUP**

The LDT-53500 chillers were attached to an external cold plate with resistive thermal load. An LDX-36000 High Power Laser Diode Driver was used to control the  $0.385\Omega$  resistive load. The chiller was powered on and the temperature set point was adjusted to 1°C. The LDX-36000 current was adjusted to set the heat load power to near the maximum chiller cooling capacity. The chiller was allowed to run for one hour to assure that the temperature had reached equilibrium. The chiller temperature and ambient temperature were recorded. This process was repeated for lower heat load power levels.

# RESULTS

The following graphs show the cooling power of the LDT-53500 chillers versus the temperature difference between ambient and coolant temperature (DT).



From the above graphs the maximum cooling capacity occurs when DT = 0, and the maximum DT occurs when Power = 0.

	Max Cooling		Max DT	
	53520	53540	53520	53540
H20	233W	389W	31.5C	34.1
IPA	234W	375W	29.7C	28.5
PG	233W	344W	29.1C	26.9

# CONCLUSION

The cooling capacity for the LDT-53500 series chillers vary with coolant mixture and DT. Adding isopropyl alcohol or propylene glycol will allow operation at 0°C or lower, but will reduce the cooling capacity and maximum DT.

