

# Uniphase / IE Optomech HYB B Laser Power Controller

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Revision 0.4 – 9-June-2004

## EBAY RIP OFF WARNING

Be careful when buying these laser systems on eBay or from any other untrusted source. There is a label on the laser head that says 532nm 125mW. This is *not* the rated power of the system! It is a generic warning label that is used on all of these lasers whether they are rated 5mw, 10mw, 20mw or 50mW (the highest power available in this type of laser). The way to determine the actual rated power is to look at the second set of digits in the model number on the head. For example, a head with the model number 4601-020-1000 is rated for 20mW output power. If you bought one of these as a 125mW laser, *YOU WERE RIPPED OFF* and should complain to the seller.

## Introduction

The HYB B laser controller is a microprocessor based device that provides power and cooling control for Uniphase 43xx, 46xx and 47xx series microgreen and microblue DPSS laser heads. This is a compilation of information from several sources. Items that I'm not 100% sure about are highlighted. Items in "quotes" are directly from some other document, but may not be 100% relevant.

There are 2 boards inside the HYB B power controller. The larger (main) board is the laser diode controller and peltier (TEC) controller for the laser diode. The smaller board is a second peltier (TEC) controller for the resonator.

## Main Board LEDs

LED	Color - Function	Notes
	Orange/Green – laser emission	Closest to edge of board
	Red – system power/interlock	
	Red – "SHTS"	High temperature shutdown? Never seen this come on
	Green – TEC 1 Temperature Lock	Lights when TEC 1 temperature has stabilized

## Peltier Board LEDs

LED	Function	Notes
D7	TEC 2 Temperature lock	Lights when TEC 2 temperature has stabilized

## Main Board Potentiometers

VR	Function	Notes
VR1	TEC 1 Temperature Set	
VR2	Laser Diode Power Sense Gain	No apparent effect
VR3	Power / Current Setpoint	Sets laser current when in current mode or output power when in power mode
VR4	Laser Power Sense Gain	Controls gain of power monitor circuit
VR5	Current Limit Set	See con3-5

## Peltier Board Potentiometers

VR	Function	Notes
VR1	TEC 2 Temperature set	

## Main Board Connectors

### CON1 (DB-25) – to Laser Head

Pin	Function	Notes
1	TEC 1 + (pump)	
2	Laser Diode Anode (+)	
3		
4	Monitor Photodiode Cathode (-)	

5	TEC 2 + (cavity)	
6	0VA	Analog ground
7	Thermistor 1 (pump)	
8	Thermistor 1	
9	Peltier 2 –	
10		
11		
12	Thermistor 2 (cavity)	
13	5V	
14	TEC 1 –	
15	Laser Diode Cathode (-)	
16	Monitor Photodiode Anode (+)	
17	-5.12V ref	
18		
19		
20		
21	Thermistor 2	
22		
23		
24	Interlock	
25	Gnd	

### CON2 (DB15) – “Outside World”

Still haven't figured out how to use the RS-232 signals. External power control is possible with a 10K pot between pins 3 and 4 with the wiper to pin 5.

Pin	Function	Notes
1	+5V	
2	0V	Digital ground
3	5.12V ref	
4	0VA	Analog ground
5	Setpoint input	Overrides VR3
6	ON-Off Input	Connect to pin2 for laser on
7	“Shutter Control Input”	
8	“Interlock +”	
9	Temperature Lock	5V = locked, 0V = unlocked
10	GND	RS-232
11	RXD	RS-232
12	TXD	RS-232
13	Interlock Status	5V = interlock open, 0V = closed
14	On/off status	5V = off, 0V = on
15	“Shutter Status”	

### CON3 (26 pin header) – Monitoring

Pin	Function	Notes
1	Laser Power	Docs say 1V/Watt, but nowhere close
2	Laser Setpoint	1V/Watt (see above)
3	0VA	Analog ground
4	Laser Current	0.5V/Amp
5	Current Limit	0.5V/Amp
6	TEC 1 Temperature Setpoint	100mV/C

7	TEC 1 Actual Temperature	100mV/C
8	0VA	Analog ground
9	Peltier Current	1V/Amp
10	MPD Output	1V/Watt
11	V Pelt (1)	
12	V Diode (1)	
13	12V	
14	0V	
15	-12V	
16	TEC 1 Temperature Lock	+5V = unlocked, 0V = locked
17	On/off status	+5V = off, 0V = on
18	5.12V ref	
19	-5.12V ref	
20	0V	
21	5V	
22	-15V	
23		
24		
25	Mode	+5V = power, 0V = current
26		“Shutter status”

#### CON4 (4 pin screw terminal) – Power Input

Pin	Function	Notes
1	5V	To DIN5 pin 1 (most clockwise looking into socket)
2	GND	To DIN5 Pins 3,4
3	Vplt	Power out to Peltier Board
4	GND	Power out to Peltier Board

#### CON5 (6 pin header) – Expanded Control Input

Pin	Function	Notes
1	“Laser Power Sense”	?
2	“Laser Power”	?
3	“Laser Diode Power Sense”	?
4	“Laser Diode Power”	?
5	“User V in”	Wired to peltier board con1 -1
6	GND	

#### CON6 (4 pin header) – “Alternative Input Voltage”

Pin	Function	Notes
1	12V	This is an output used to power the TEC board
2	0VA	ground
3	-12V	This is an output
4	Not Connected	Actually connected to thermistor2 and wired to peltier board con1 -2

## **Peltier Board Connectors**

This information was not specified in the original documents and is inferred from specifications for the other connectors and inspection of the internal wiring.

### **CON1 (4 pin header) – I/O**

Pin	Function	Notes
1	Thermistor	Wired to main board con5-6
2	Thermistor	Wired to main board con6-4
3	Peltier Drive +	Wired to main board con1 -5
4	Peltier Drive -	Wired to main board con1 -9

### **CON2 (8 pin header) – monitor (most pins wired to con100)**

Pin	Function	Notes
1	Temperature Lock	-12V = locked, 1.4V = unlocked
2	Temperature	0.1V/degree C
3	Temperature Setpoint	0.1V/degree C
4	Peltier Current	
5	12V	Wired to main board con6- 1
6	n/c	
7	0VA	Wired to main board con6-2 and con100 pin 3
8	-12V	Wired to main board con6-3

### **CON100 (DB9) – Shutter Control and Temperature 2 Control Monitoring**

Pin	Function	Notes
1	5V	Actually connected to ground
2	“Shutter Sense”	Not Connected
3	0VA	Analog ground
4	Temperature 2	0.1V/degree C
5	Temperature Setpoint 2	0.1V/degree C
6	“Shutter Switching Output”	Not Connected
7	“Shutter Sense Rtn”	Not Connected
8	Peltier Current	
9	Temperature Lock	-12V = locked, 1.4V = unlocked

### **CON3 – Power Input**

Pin	Function	Notes
1	+5V	
2	GND	

## **Main Board Solder Link Specifications**

Most of the solder links are on the bottom of the board

Link	Function	Notes
1	Processor Set Current Limit	Open
2	Processor temp set point	Open
3	Processor set point	Open
4	Control on MPD feedback	Open
5	Processor Mode Select	Closed
6	Control on Laser MPD Feedback	Closed
7	Link to Power Feedback	Closed
8	-12V inductor short	
9	5V to DC-DC Converter Inductor short	
10	12V inductor short	
11	0VA to GND link	
12	Vplt to Peltier	Closed
13	5V to Peltier	Closed
14	Select Power to RS-232	Closed
15	Select 5V RXD	Open
16	Select full RS-232 RXD	Closed
17	Select full RS-232 TXD	Closed
18	Select 5V RS232	Open
19	GND inductor for DC-DC converter short	
LK1	Mode Select	Open (close to force light feedback mode)

### **DB25 – HD15 Controller to Laser Head Cable (4600, 4700 heads)**

This is verified by inspection of a factory made cable

HD15	Signal	Wire Color	DB25
1	+5V	white/yellow	13
2	SEEPROM CLK	violet	n/c
3	SEEPROM Data	blue	n/c
4	Monitor Photodiode Anode	black	16
5	Monitor Photodiode Cathode	brown	4
6	GND	white/green	6
7	TEC 1 -	white/violet	14
8	TEC 2 -	white/brown	5
9	Thermistor 2	red	12
10	0VA (Thermistor common)	orange	8,21
11	TEC 2 +	white/black	9
12	TEC 1 +	white/blue	1
13	Laser Diode Anode	white/red	2
14	Thermistor 1	yellow	7
15	Laser Diode Cathode	white/orange	16
	Shield	Bare	24,25

## **DB25 – HD15 Controller to Laser Head Cable (4300 head)**

These are an older generation of Uniphase MicroGreen lasers. This pinout has not yet been verified – use at your own risk!

<b>HD15</b>	<b>Signal</b>	<b>HYB B DB25</b>
1	TEC 1 +	1
2	Laser Diode Anode	2
3	N/C	
4	Photodiode Cathode	4
5	Thermistor 1	7
6	TEC 1 -	14
7	Laser Diode Cathode	15
8	N/C	
9	Photodiode Anode	16
10	Thermistor 1	8
11	TEC 2 +	5
12	TEC 2 -	9
13	Thermistor 2	12
14	Thermistor 2	21
15	N/C	

## **DB9 on Miniature heads**

These are similar to the G30.

<b>DB9</b>	<b>Signal</b>	<b>Notes</b>
1	Laser Diode Anode	Reverse protection diode inside head
2	Laser Diode Cathode	
3	Photodiode Anode	
4	TEC +	
5	TEC -	
6	Photodiode Cathode	
7	Thermistor	
8	Thermistor	
9	N/C	