



LDTC2/2

Combine the drive power of the WLD3343 with the temperature stability of the WTC3243

GENERAL DESCRIPTION:

The LDTC 2/2 combines a 2.2 Amp laser driver and 2.2 Amp temperature controller on one small board. Available as an open frame or in a chassis mount enclosure.

The WTC3243 will control temperature using thermistors, RTDs, or linear temperature sensors such as the LM335 or the AD590. Adjust temperature using the onboard trimpot or a remote voltage input from a panel mount potentiometer, DAC, or other voltage source. A default temperature setpoint configuration provides fault tolerance and avoids accidental damage to system components. Adjustable trimpots configure heat and cool current limits.

The heart of the laser driver section is the WLD3343 2.2 Amp Laser Driver. It maintains precision laser diode current (Constant Current mode) or stable photodiode current (Constant Power mode) using electronics compatible with A/B Type lasers.

Ideal for integrated laser driver or LED packages that include temperature control, often utilized in medical diagnostic equipment, remote sensing, analytical instrumentation, military and communications applications.



FEATURES, LDTC2/2:

- Small package size
- Single supply operation possible
- Cost Effective

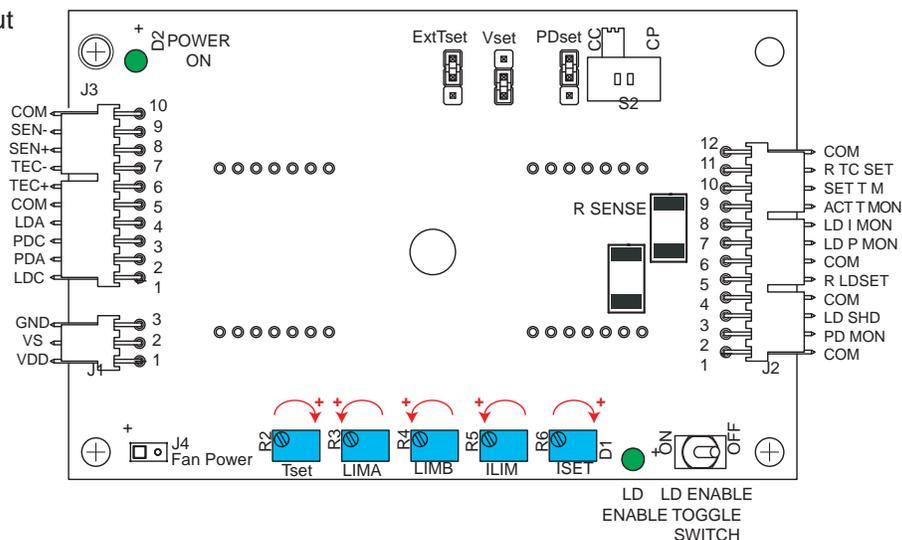
FEATURES, Laser Diode Driver:

- Default current range is 2.2 A. Custom ranges, from 3 mA up, are easily configured
- Slow start laser diode protection
- Constant Current or Constant Power modes
- Compatible with A or B type laser diodes
- Adjustable laser diode current limit
- Remote TTL Shutdown / Interlock

FEATURES, Temperature Controller:

- Drive up to 2.2 A of TEC current
- Set temp using D/A - includes default to 1 Volt to avoid drive when D/A is turned off or signal is lost
- Ultra-stable PI control loop
- Separate Heat & Cool current limits
- Single power supply operation possible

Figure 1
Top View Pin Layout and Descriptions



ABSOLUTE MAXIMUM RATINGS			
	SYMBOL	VALUE	UNIT
Operating Temperature, case ^[1]	T _{OPR}	- 40 to + 85	°C
Storage Temperature	T _{STG}	- 65 to +150	°C
Weight - with enclosure	LDTC2/2E	6.5	oz
Weight - open frame	LDTC2/2O	2.4	oz
WLD3343 Laser Diode Driver Rating			
	SYMBOL	VALUE	UNIT
Supply Voltage (Voltage on Pin 14)	V _{DD}	+4.75 to +12	Volts DC
Output Current (See SOA Chart)	I _{LD}	2.2	Amps
Power Dissipation, T _{AMBIENT} = +25°C	P _{MAX}	9	Watts
WTC3243 Temperature Controller Rating			
	SYMBOL	VALUE	UNIT
Supply Voltage 1 (Voltage on Pin 1)	V _{DD}	+4.75 to +12	Volts DC
Supply Voltage 2 (Voltage on Pin 14)	V _S	+4.5 to +28	Volts DC
Output Current (See SOA Chart)	I _{OUT}	±2.2	Amps
Power Dissipation, T _{AMBIENT} = +25°C (with fan and heat sink per SOA Chart)	P _{MAX}	9	Watts

Laser Diode Driver PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
CONSTANT CURRENT CONTROL					
Long Term Stability, 24 hours	T _{AMBIENT} = 25°C		50	75	ppm
CONSTANT POWER CONTROL					
Long Term Stability, 24 hours	T _{AMBIENT} = 25°C	0.02		0.05	%
Short Term Stability, 1 hour	T _{AMBIENT} = 25°C		0.01		%
OUTPUT					
Current, peak, see SOA chart	With Heat Sink and Fan	1.8	2.0	2.2	Amps
Compliance Voltage, Laser Diode Load	Full Temp. Range, I _{LD} = 2.0 Amps, 5V	3.0			Volts
Rise Time	I _{LD} = 2 Amps		460		nsec
Fall Time	I _{LD} = 2 Amps		320		nsec
Bandwidth	Constant Current, Sine Wave		1.6		MHz
Bandwidth	Constant Power	(Depends on PD BW)			
Delayed Start			0.25		Seconds
Slow Start Ramp Rate			0.01		Seconds
POWER SUPPLY					
Voltage, V _{DD}		5		12	Volts
Current, V _{DD} supply, quiescent		5	10	15	mA
INPUT					
Offset Voltage, initial, I _{mon}	Pin 2, T _{AMBIENT} = 25°C, V _{CM} = 0V		1	5	mV
Bias Current (based on input Res of op amp)	Pin 2, T _{AMBIENT} = 25°C, V _{CM} = 0V		20	50	nA
Common Mode Range	Pin 2, Full Temperature Range	0		V _{DD}	V
Common Mode Rejection, Set point	Full Temperature Range	60	85		dB
Power Supply Rejection	Full Temperature Range	60	80		dB
VSET Damage Threshold		< -0.5	> V _{DD} + 0.5		V

^[1] With Revision D of the WLD3343, an internal thermostat has been added to activate Shutdown (SHD) when the internal temperature exceeds 105°C. The output will be re-enabled after a 250 to 300 msec slow-start once the internal temperature drops below 95°C.

CAUTION: Operation higher than 5V on VDD (i.e. 12V) requires close evaluation of the SOA curves and current limit settings. Damage to the WLD or WTC will occur if they are operated outside their Safe Operating Area. Contact the factory if you plan to use higher than 5V.

Temperature Controller PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
TEMPERATURE CONTROL					
Short Term Stability, 1 hour ^[2]	OFF ambient, TSET = 25°C/10 kΩ thermistor		0.0009		°C
Short Term Stability, 1 hour ^[2]	ON ambient, TSET = 25°C/10 kΩ thermistor		0.002		°C
Long Term Stability, 24 hour ^[2]	OFF ambient, TSET = 25°C/10 kΩ thermistor		0.002		°C
Control Loop		P	PI		
P (Proportional Gain)		18	20	22	A/V
I (Integrator Time Constant)		2	3	4	Sec.
Setpoint vs. Actual T Accuracy	TSET = 25°C using 10 kΩ thermistor		<0.2%(Rev B)		
OUTPUT					
Current, peak, see SOA Chart		±1.8	±2.0	± 2.2	Amps
Compliance Voltage, Pin 11 to Pin 12	Full Temp. Range, I _{OUT} = 100 mA		V _S - 0.1		Volts
Compliance Voltage, Pin 11 to Pin 12	Full Temp. Range, I _{OUT} = 1 Amp		V _S - 0.3		Volts
Compliance Voltage, Pin 11 to Pin 12	Full Temp. Range, I _{OUT} = 1.5 Amps		V _S - 0.3		Volts
Compliance Voltage, Pin 11 to Pin 12	Full Temp. Range, I _{OUT} = 2.0 Amps		V _S - 0.6		Volts
Resistive Heater	Full Temp. Range, I _{OUT} = 2.2 Amps		V _S - 0.6		Volts
POWER SUPPLY					
Voltage, VDD		4.75		12	Volts
Current, VDD supply, quiescent			55	105	mA
Voltage, Vs		4.5		28	Volts
Current, Vs supply, quiescent		20	50	100	mA
TEMPERATURE SENSORS					
Sensor Compatibility	Thermistors, RTD, IC Sensors				
Sensor Input Voltage Range ^[3]			GND to V _{DD} -2		Volts
Sensor Input Damage Threshold			>V _{DD} +7 or <-0.7		Volts
VSET					
Input Impedence			500		kΩ
VSET Damage Threshold			>V _{DD} +7 or <-0.7		Volts
BIAS CURRENT					
Bias Current Accuracy	Include bias current resistor tolerance		1		%
THERMAL					
Heatspreader Temperature Rise	T _{AMBIENT} = 25°C	28	30	33	°C/W
Heatspreader Temperature Rise	With WHS302 Heat sink and WTW002 Thermal Washer	18	21.5	25	°C/W
Heatspreader Temperature Rise	With WHS302 Heat sink, WTW002 Thermal Washer and 3.5 CFM fan	3.1	3.4	3.9	°C/W

^[2] When using resistive heaters, stability can only be consistently achieved when specified temperatures are 10°C or more above ambient.

^[3] The bias source has a compliance up to VDD - 2 V. In normal operation this limits the sensor voltage range from 0 V to VDD - 2 V. While voltages up to ±5 V outside this range on the VSET pin will not damage the unit, it will not provide proper control under these conditions.

PIN DESCRIPTIONS

Connector 1 (J1)

Pin	Pin #	Name	Function
VDD	1 (RED)	Supply Voltage to Control Electronics and Laser Diode	Connect +5 to +12 V between pins 1 & 3 to power the control electronics and the output drive to the Laser Diode. Use the online Safe Operating Area calculator to make sure maximum internal power dissipation in the WLD is not exceeded - especially when using greater than +5 V.
VS	2 (WHT)	Supply Voltage to Output TEC Drive	Connect +5 to +28 V between pins 2 & 3 to drive the TEC output stage - Use the online Safe Operating Area calculator to make sure maximum internal power dissipation in the WTC is not exceeded - especially when using greater than +5 V.
GND	3 (BLK)	Power Supply Ground	Connect power supply ground to this pin.

Connector 2 (J2)

COM	1 (TAN)	Common	Low current GND for monitors, DACs, External VSET, etc. PIN 1 not available on Rev. A
PD MON	2 (PNK)	PD Monitor in CC mode	Photodiode Monitor in constant current mode PIN 2 not available on Rev. A
LD SHD	3 (GRY)	LD Shutdown / Interlock (TTL-Compatible)	Float or GND = Enable Laser Diode Current Input >3V = Disable Laser Diode Current
COM	4 (VLT)	Common	Low current GND for monitors, DACs, External VSET, etc.
R LDSET	5 (YEL)	Remote Laser Diode Setpoint/Modulation Input	Voltage Input range is 0 to 2 V. Transfer function: $V_{R\ LDSET} = I_{LD} * (2 R_{SENSE})$
COM	6 (ORG)	Common	Low current GND for monitors, DACs, External VSET, etc.
LD P M	7 (BLU)	Photodiode Monitor	Monitor the laser diode power. The Photodiode Current Monitor produces a voltage proportional to the current produced by the laser diode monitor photodiode.
LD I M	8 (BRN)	LD Current Monitor	Monitor the laser diode forward current. The Laser Diode Current Monitor produces a voltage proportional to the current flowing through the laser diode.
ACT T M	9 (GRN)	Actual Temp Monitor	Monitor the actual voltage produced by the temperature sensor. The voltage produced and transfer function to temperature is determined by the sensor chosen.
SET T M	10 (RED)	Setpoint Monitor	Monitor the temperature setpoint voltage. The voltage produced and transfer function to temperature is determined by the sensor chosen.
R TCSET	11 (WHT)	Remote Temperature Setpoint	Connect a voltage source between Pin 11 (VSET) and Pin 12 (GND) to control the temperature setting remotely. A default value of 1 V (about room temperature with 10 kΩ thermistor) will be seen by the WTC if the voltage at this pin drops below 0.3 V.
COM	12 (BLK)	Common	Low current GND for monitors, DACs, External VSET, etc.

Connector 3 (J3)

LDC	1 (BLK)	Laser Diode Cathode	Laser diode cathode connection
PDA	2 (WHT)	Photodiode Anode	Photodiode anode connection
PDC	3 (BLU)	Photodiode Cathode	Photodiode cathode connection
LDA	4 (RED)	Laser Diode Anode	Laser diode anode connection
COM	5 (GRN)	Common	Low current GND
TEC+	6 (RD/BK)	TEC + connection	Cooling current flows from this pin when using an NTC sensor.
TEC-	7 (ORG)	TEC - connection	Heating current flows from this pin when using an NTC sensor.
SEN+	8 (WT/BK)	Temperature Sensor +	Connect resistive and LM335 type temperature sensors across Pin 8 and Pin 9. Connect a 10 kΩ resistor across these pins when using AD590 type temperature sensors. The negative terminal of the AD590 sensor connects to Pin 8 and the positive terminal to Pin 1 (VDD) of Connector 1. AD590 operation requires that VDD be +8 Volts or greater for proper operation.
SEN-	9 (OR/BK)	Temperature Sensor -	
COM	10 (GR/BK)	Common	Low current GND for monitors, DACs, External VSET, etc.