

SDC-1A-PRO diode controller

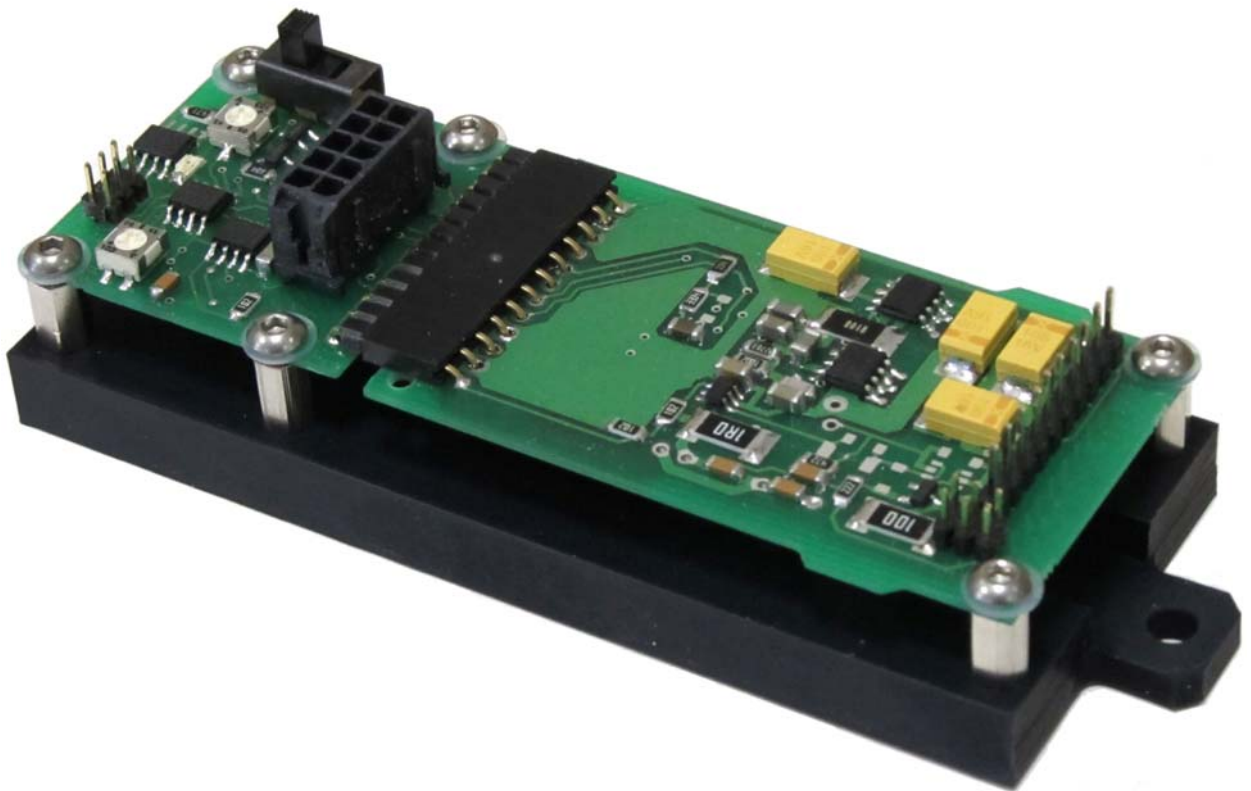
User Manual

Overview

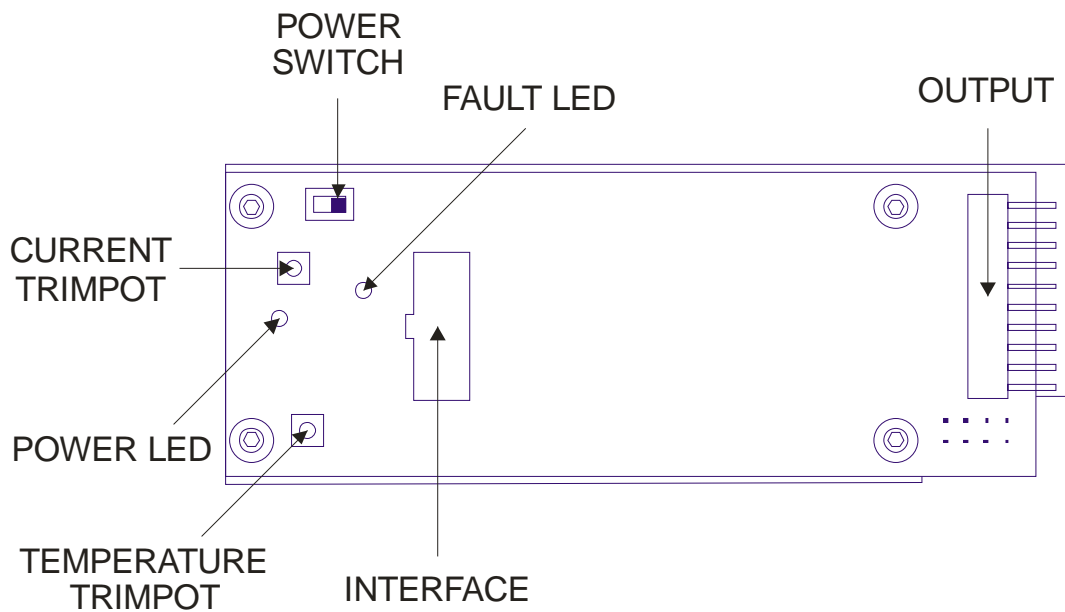
SDC-1A-PRO diode controller is a complete solution for single laser diode driving. Module combines both diode driver (current source) and bi-polar temperature controller (TEC) into one board. Some interface circuits are also integrated.

Maximal output current is 1A. Current may be CW, analog or digitally modulated.

For operations in CW mode module must be connected to the laser diode, peltier cooling module, 10 kOhm NTC thermistor and power source (+5V DC). For modulated output module must be connected to external pulse generator.



Description



POWER SWITCH – turns module on (to the left) and off (to the right)

CURRENT TRIMPOT – regulates output current (0 – 1A range by default, other on request), counterclockwise rotation increases the current.

TEMPERATURE TRIMPOT – regulates temperature set point (15 – 40 C range by default [with 10 kOhm NTC], other on request), clockwise rotation increases the temperature.

POWER LED – indicates if module is turned on

FAULT LED – indicates if module is failed

OUTPUT connector – connects module with diode, peltier module, 10 kOhm NTC and photodiode (adjusted cable is supplied with the module)

INTERFACE connector – transmits input/output signals. Moreover module is fed through this connector (adjusted cable is supplied with the module)

OUTPUT : 10 PIN WR-PHD 2.54MM, ANGLED, MALE

PIN / TYPE	DESIGNATION	DESCRIPTION
1, 2 (blue) / OUTPUT	DIODE –	Laser diode cathode
3, 4 (red) / OUTPUT	DIODE +	Laser diode anode
5 (green) / INPUT	PHD +	Photodiode anode It's supposed that photodiode cathode and diode anode are connected within diode assembly
6, 7 (purple) / INPUT	NTC RETURN	Return of NTC
8 (white) / OUTPUT	TEC –	Peltier cooler module –
9 (orange) / OUTPUT	TEC +	Peltier cooler module +
10 (purple) / INPUT	NTC	10 kOhm NTC thermistor must be connected to this pin and to one of NTC RETURN pins

INTERFACE : 10 PIN MOLEX MICROFIT

PIN / TYPE	DESIGNATION	DESCRIPTION
1, 7 (black)	GND	Ground
2 (blue) INPUT	DM	Digital modulation. 0V applied to this pin (or leaving this pin free-standing) allows output. 5V applied to this pin suppresses output.
3 (transparent) OUTPUT	TIMER	Internal timer shows running hours of the module. Output voltage at this pin is linear with running hours. 5V corresponds to 10 000 hours, afterthen 5V forever.
4 (purple) INPUT	AM	Analog modulation. Like digital modulation analog modulation has reverse polarity. 0V applied to this pin (or leaving this pin free-standing) allows output. 2.5V applied to this pin suppresses output.
5 (yellow) OUTPUT	TEMP. SET POINT MONITOR	Temperature set point monitor. Output voltage at this pin shows temperature set point. Dependence isn't linear. 0V corresponds to Tmin, 4V to Tmax. For Tmin, Tmax and T(V) curve see Temperature calibration section.
6 (red) INPUT	+5V DC	Feeding voltage +5V DC.
8 (white) OUTPUT	CURRENT SET POINT MONITOR	Current set point monitor. Voltage at this pin is linear with the current settled with the trimpot. 0V – 0A, 2.5V – 1A.
9 (green) OUTPUT	PHD	Photodiode. If photodiode is connected to the OUTPUT connector, output voltage at this pin is proportional to photodiode current. 10mV corresponds to 1uA of photodiode output current.
10 (orange) OUTPUT	TEMP. MONITOR	Temperature monitor. Output voltage at this pin shows measured diode temperature. Dependence isn't linear. 0V corresponds to Tmin, 4V to Tmax. For Tmin, Tmax and T(V) curve see Temperature calibration section.

Operations (CW)

1. Connect to the module
 - laser diode
 - peltier cooling module
 - 10 kOhm NTC thermistor
2. Ensure that POWER SWITCH is off,
Set zero current (turn CURRENT TRIMPOT to the right)
3. Connect module to +5V DC power supply
4. Turn POWER SWITCH on
5. Set desired current (turn CURRENT TRIMPOT to the left)

Faults / Protections

Module sets FAULT state (lights FAULT LED and suppresses output) in the following situations:

- Diode not connected
- Diode overtemperature, undertemperature, NTC not connected

To start operations again you need to turn the power off, then avoid the fault cause and afterthen turn the power on again.

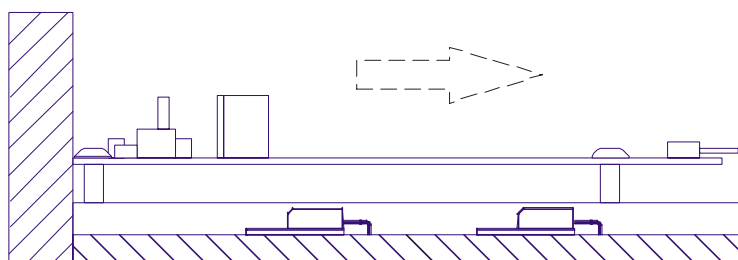
Besides abovementioned module is protected from as follows:

- Short-circuited diode output, short-circuited peltier cooling module output
- Reverse input polarity
- Input overvoltage (module stops operations when input voltage exceeds 5.5V and starts again when input voltage falls below 5.3V)
- Input undervoltage (module stops operations when input voltage falls below 4.2V and starts again when input voltage exceeds 5.0V)

Cooling

In standard environmental conditions (0-30°C temperature, no tight envelopes) no cooling is needed. Elsewise either passive cooling by mounting onto larger heatsink or active forced air cooling may be needed.

Optionally 40x40x10 mm fan may be preinstalled as it's shown on the picture below. Because of +5V DC fan input, no additional feeding level are required.



Specification

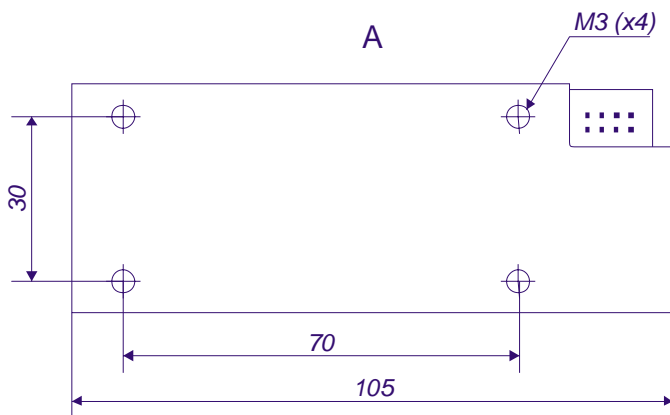
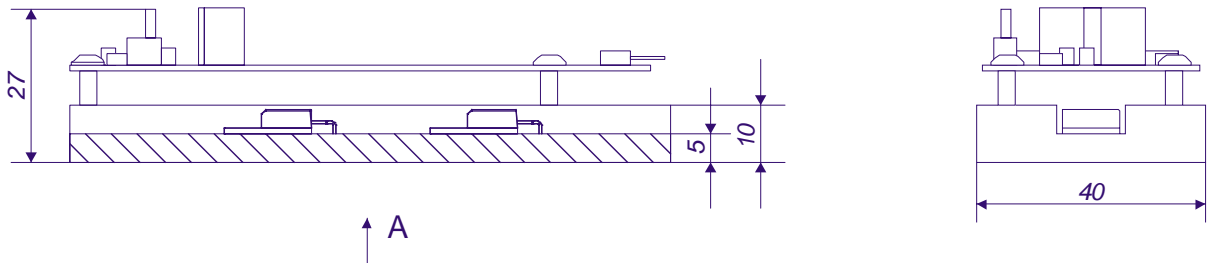
ELECTRICAL SPECIFICATION

Input:	
Input voltage	+ 4.2-5.5V DC
Max. current	2.7 A max
Output (current source):	
Max. current	1 A
Compliance voltage	3 V
Current stability	better than 5 mA
Overshooting protection	+
Output (TEC):	
Max. voltage	4 V
Max. current	2 A
Temperature set point	15 – 40 C (with 10 kOhm NTC)
Thermocontroller accuracy	0.1 C
Monitors:	
Current set point monitor	0-2.5 V, linear
Temp. set point monitor	0-4 V, nonlinear
Temp. monitor	0-4 V, nonlinear
Photodiode monitor	0-5 V, linear with photocurrent
Running hours monitor	0-5 V, linear with running hours
Modulation:	
Analog	up to 300 kHz by default up to 1 MHz in -HF version
Digital	up to 3 MHz by default up to 10 MHz in -HF version
Faults:	
	not connected diode
	diode overtemperature, diode undertemperature, NTC not connected
Protections:	
	input overvoltage
	input undervoltage
	reverse input polarity
	short-circuited loads
Environment:	
Operation temperature	0...+40 C
Storage temperature	-20...+60 C
Humidity	90%, non-condensing

MECHANICAL SPECIFICATION

Size (LxWxH)	105 x 40 x 27 mm
Weight	0.2 kg

DRAWINGS

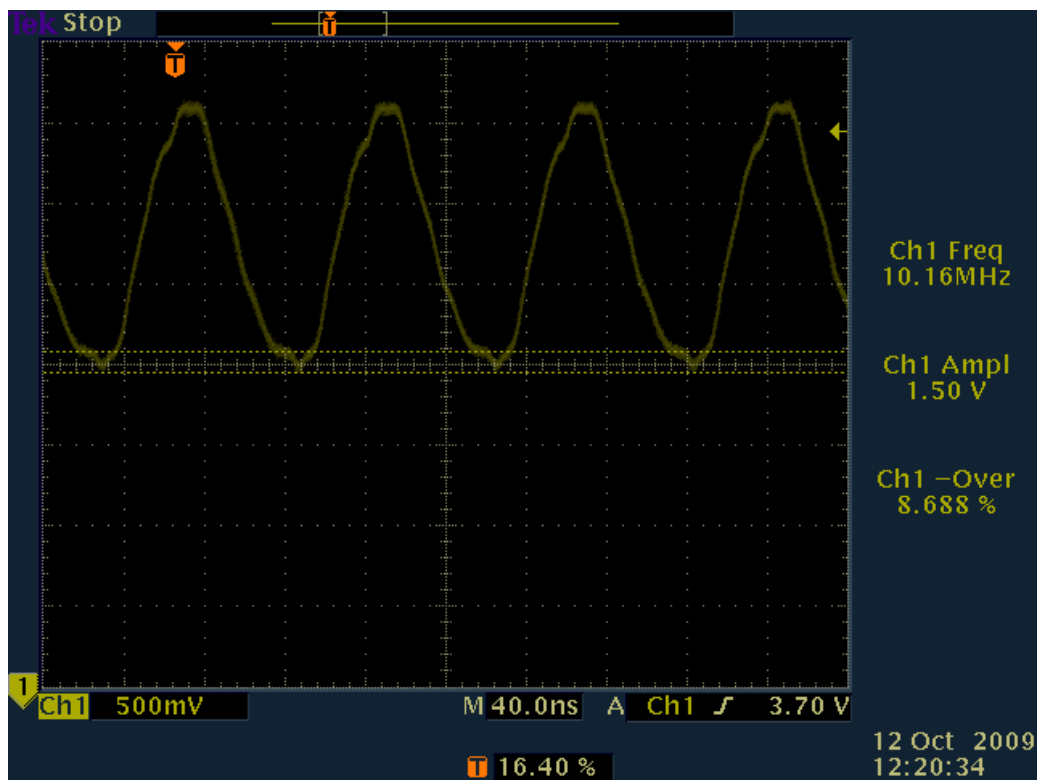


Part numbers

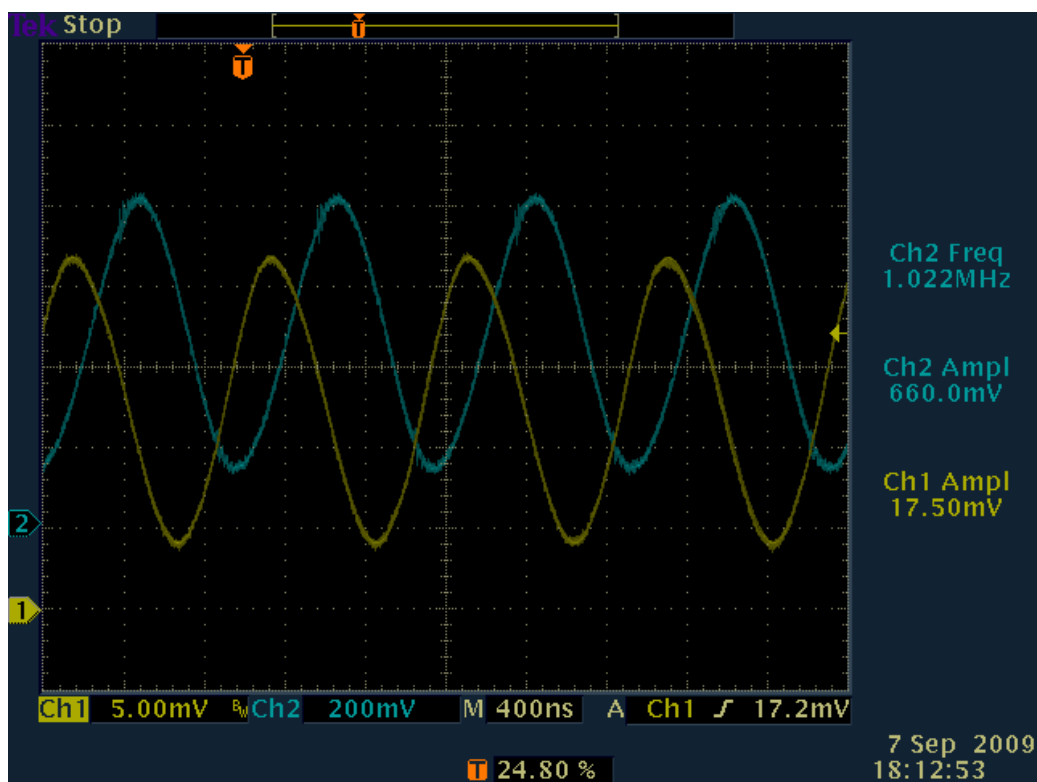
SDC-1A-PRO	Standard version
-HF	High frequency option - 10 MHz digital modulation - 1 MHz analog modulation
-FAN	Fan option

Example : SDC-1A-PRO-HF

Miscellaneous



SDC-1A-PRO-HF: Digital modulation, 10 MHz, rise/fall time ~30-40 ns



SDC-1A-PRO-HF: Analog modulation, 1 MHz

Temperature calibration

TEMPERATURE	TEMP. MONITOR / TEMP. SET POINT MONITOR
15	4,09
16	3,92
17	3,74
18	3,57
19	3,4
20	3,23
21	3,06
22	2,89
23	2,72
24	2,55
25	2,38
26	2,21
27	2,04
28	1,88
29	1,71
30	1,55
31	1,39
32	1,23
33	1,07
34	0,91
35	0,76
36	0,61
37	0,47
38	0,32
39	0,18
40	0,03

This calibration table is absolutely valid for EPCOS B57861S0103F040 thermistors. Other 10kOhm NTC may have a little different R/T curves.