SenseFuture

LC Laser Diode Driver Board

PRODUCT INTRODUCTION MANUAL

Striving for the Bright Future of Precision Optical Measurement.

SenseFuture Technologies Co., Ltd.

Laser Diode Driver Board

01 Product Functions

The Laser Diode Driver Board is used for driving all types of lasers with a current up to 1000mA, including VCSEL, DBR, DFB, LD, ICL, QCL lasers, etc. The laser drive current can be adjusted by altering the input voltage.

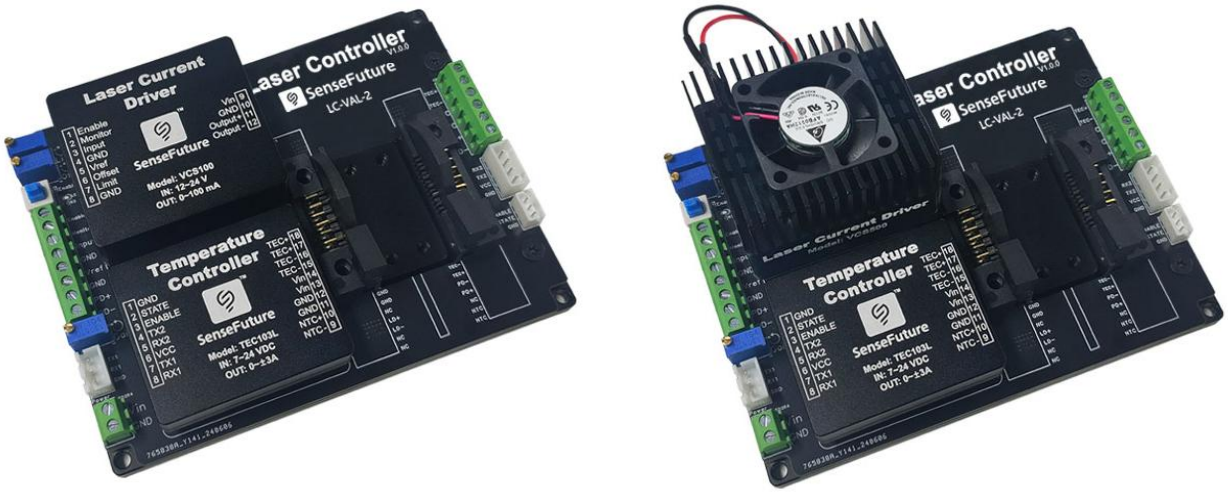


Figure1 Laser Diode Driver Board

02 Product Features

- Modular design allows flexible configuration with various temperature control modules and current drivers, compatible with all low-power lasers including VCSEL, DBR, DFB, LD, ICL, QCL, etc.
- Temperature control accuracy up to ±0.001°C
- Low current noise with RMS < 1μA.
- Capable of delivering output voltage and current up to 23V/1A.
- Features maximum output current limitation for safe laser protection.
- Supports remote control of output enable and monitoring of output current.
- Enables 2MHz current modulation.
- Integrates a PD (Photodiode) monitor for feedback control.

03 Product Parameters

Table1 Basic Parameters of LC

PARAMETERS	MODEL	UNIT
	LC100mA-0.001℃-1	
Maximum Output Current	100mA(Matching with VCS100) 250mA(Matching with VCS250) 500mA(Matching with VCS500) 1000mA(Matching with VCS1000)	mA
Supply Voltage	12~24	V
Output Voltage / Compliance Voltage	Vin-1	V
Current Noise	<1	μA
Adjustment Rise/Fall Time	800/500	ns
Modulation Depth	90%	@500kHz
Bandwidth	2	MHz
Modulation Input Voltage	0~5	V
Input pin impedance	>1M	Ω
Current temperature drift	<20	ppm/℃
Maximum temperature control output current	±3	A
Maximum temperature control output voltage	Vin×90%	V
Temperature control stability	±0.01°C(Matching with TEC103L) ±0.001°C(Matching with TEC103)	°C
Ambient Temperature	-15~60°C(Matching with VCS100/250/500) -15~35°C(Matching with VCS1000)	°C
Ambient Humidity	0~98	%RH
Thermal Requirements	Within the rated operating range, no additional cooling measures are required.	
Dimension	121.0*93.0*28.0mm(Matching with VCS100) 111.2*93.0*30.4mm(Matching with VCS250/500/1000)	mm^3
Weight	——(Matching with VCS100) ——(Matching with VCS250/500/1000)	g

04 Interface Introduction

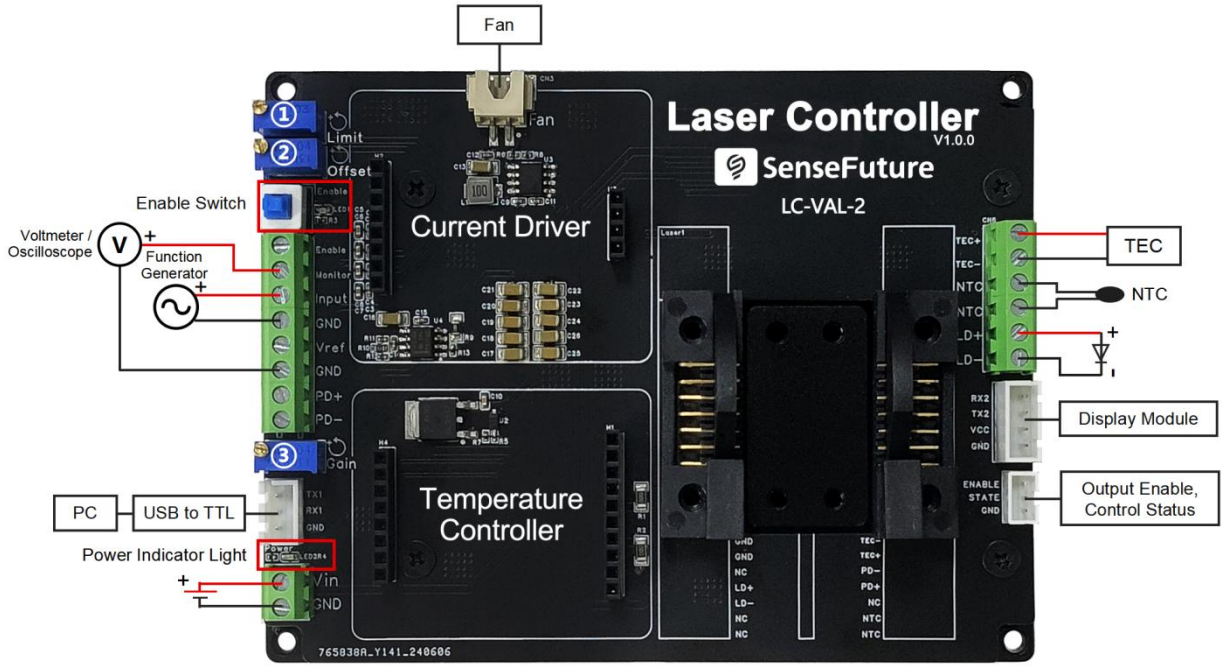


Figure2 Wiring Diagram of LC Adapter Board

Number	Knob Name	Function
①	Limit	Maximum Output Current Limit Adjustment Knob: Turn clockwise to decrease, counter-clockwise to increase.
②	Offset	Output Bias Current Adjustment Knob: Turn clockwise to decrease, counter-clockwise to increase.
③	Gain	PD Signal Amplification Factor Adjustment Knob: Turn clockwise to decrease, counter-clockwise to increase.

Table2 DFB Pin Diagram（Type 1）

Number	Function	Number	Function	Picture
1	TEC Positive Terminal	14	TEC Negative Terminal	
2	NTC	13	Case Ground	
3	Photodetector Negative Terminal	12	NC	
4	Photodetector Positive Terminal	11	Laser Diode Positive Terminal	
5	NTC	10	Laser Diode Positive Terminal	
6	NC	9	NC	
7	NC	8	NC	

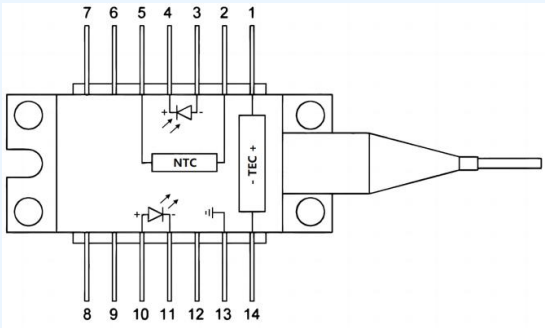
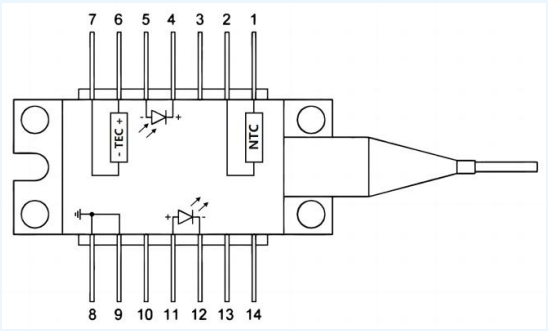


Table3 DFB Pin Diagram（Type 2）

Number	Function	Number	Function	Picture
1	NTC	14	NC	
2	NTC	13	NC	
3	NC	12	Laser Diode Positive Terminal	
4	Photodetector Positive Terminal	11	Laser Diode Positive Terminal	
5	Photodetector Negative Terminal	10	NC	
6	TEC Positive Terminal	9	Case Ground	
7	TEC Negative Terminal	8	Case Ground	

05 Dimensional Drawing

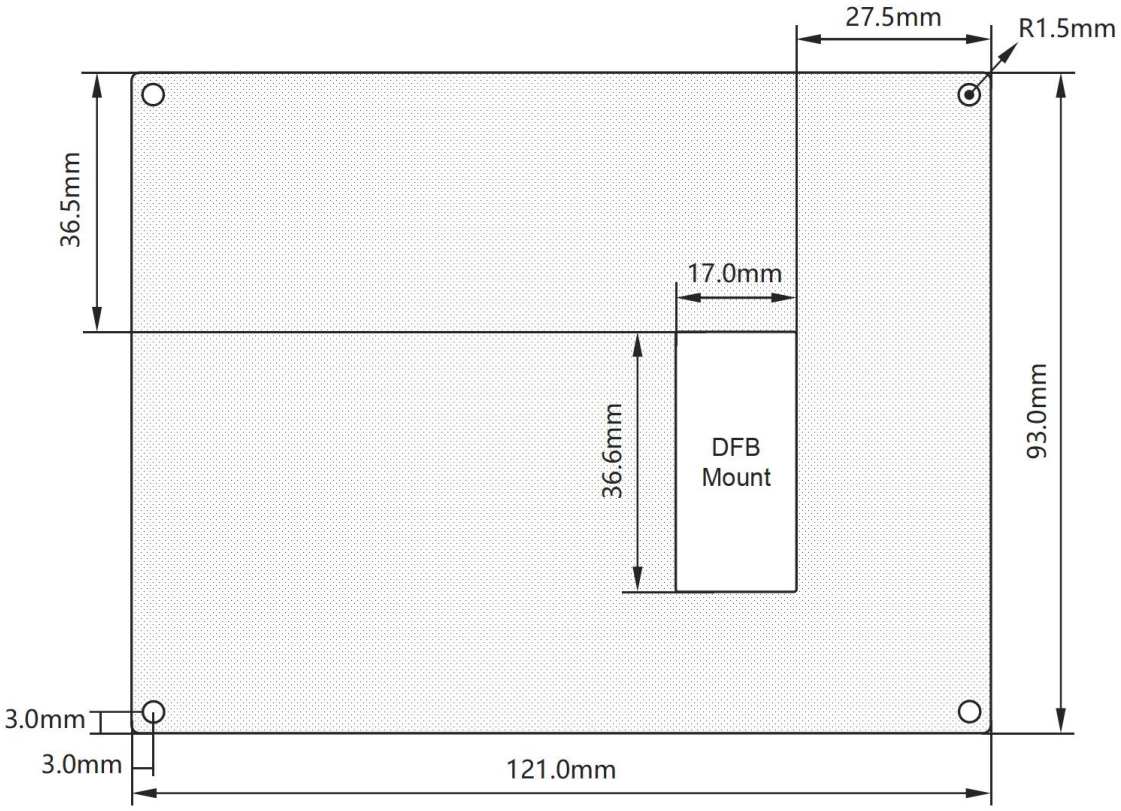


Figure3 Dimensional drawing of LC

06 Selection Guide

Table4 Laser Diode Driver Board Selection Guide

	Model	Output Current Range	Temperature Control Stability	DFB Pin Configuration
1	LC100mA-0.001℃-X	0~100mA	±0.001℃	X=1 or 2
2	LC100mA-0.01℃-X	0~100mA	±0.01℃	X=1 or 2
3	LC250mA-0.001℃-X	0~250mA	±0.001℃	X=1 or 2
4	LC250mA-0.01℃-X	0~250mA	±0.01℃	X=1 or 2
5	LC500mA-0.001℃-X	0~500mA	±0.001℃	X=1 or 2
6	LC500mA-0.01℃-X	0~500mA	±0.01℃	X=1 or 2
7	LC1000mA-0.001℃-X	0~1000mA	±0.001℃	X=1 or 2
8	LC1000mA-0.01℃-X	0~1000mA	±0.01℃	X=1 or 2

07 Test Data (Partial)

7.1 Current Noise Spectral Density

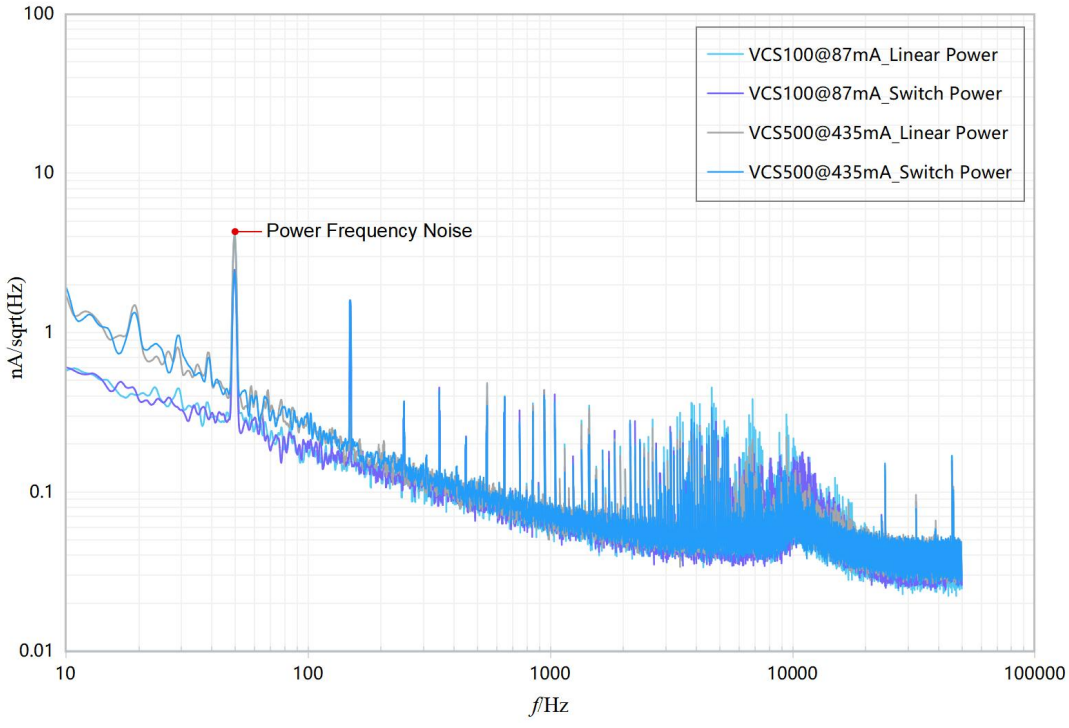


Figure4 Current Noise Spectral Density Plot of VCS

7.2 Rise/Fall Time

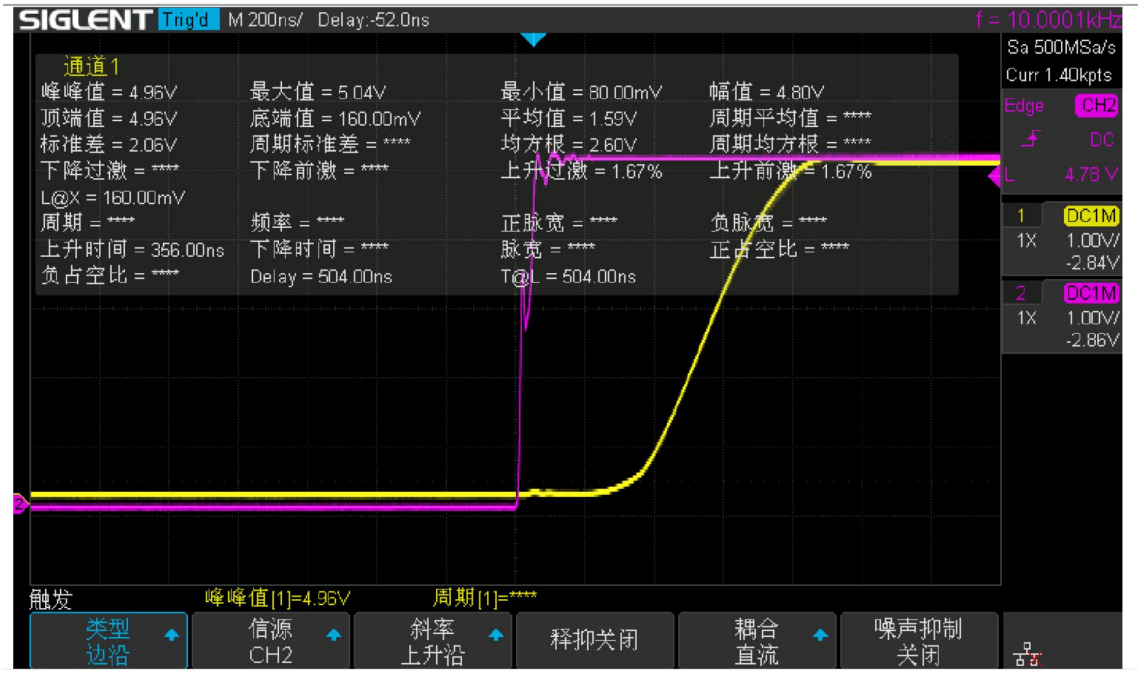


Figure5 Rise Time Test Graph

(Purple: Rising edge signal input from 0V to 5V, tested with a 10 Ohm load; Yellow: Actual curve of the current rise)

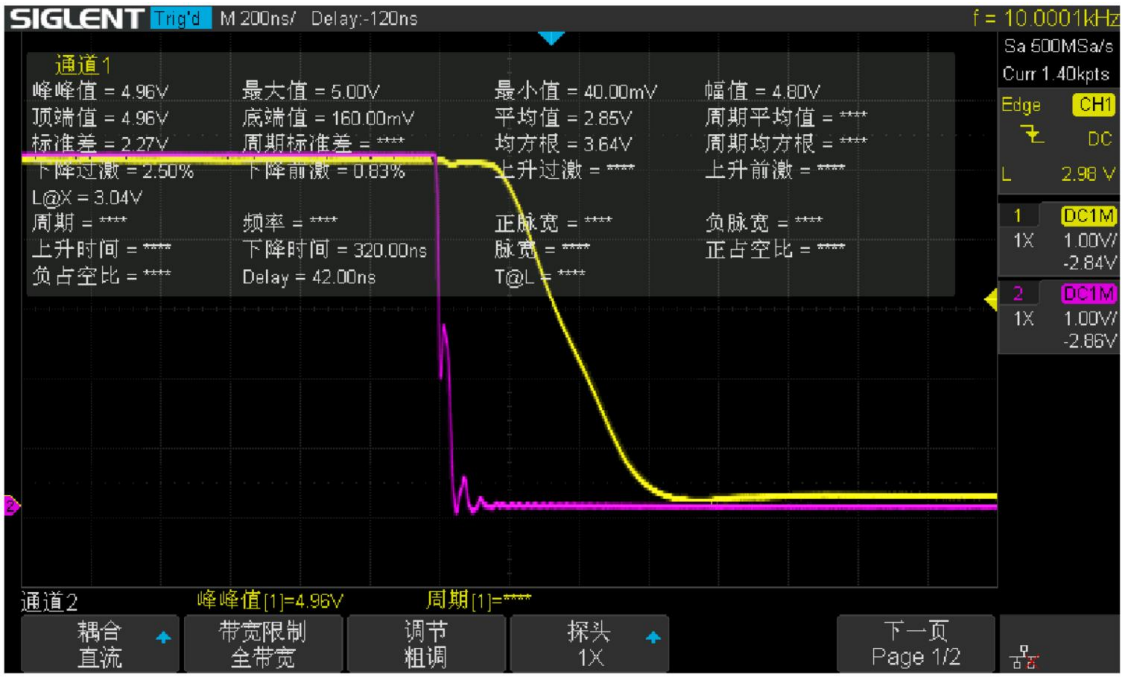


Figure6 Fall Time Test Graph

(Purple: Falling edge input from 5V to 0V, tested with a 10 Ohm load; Yellow: Actual curve of the current decay)

7.3 Modulation Depth

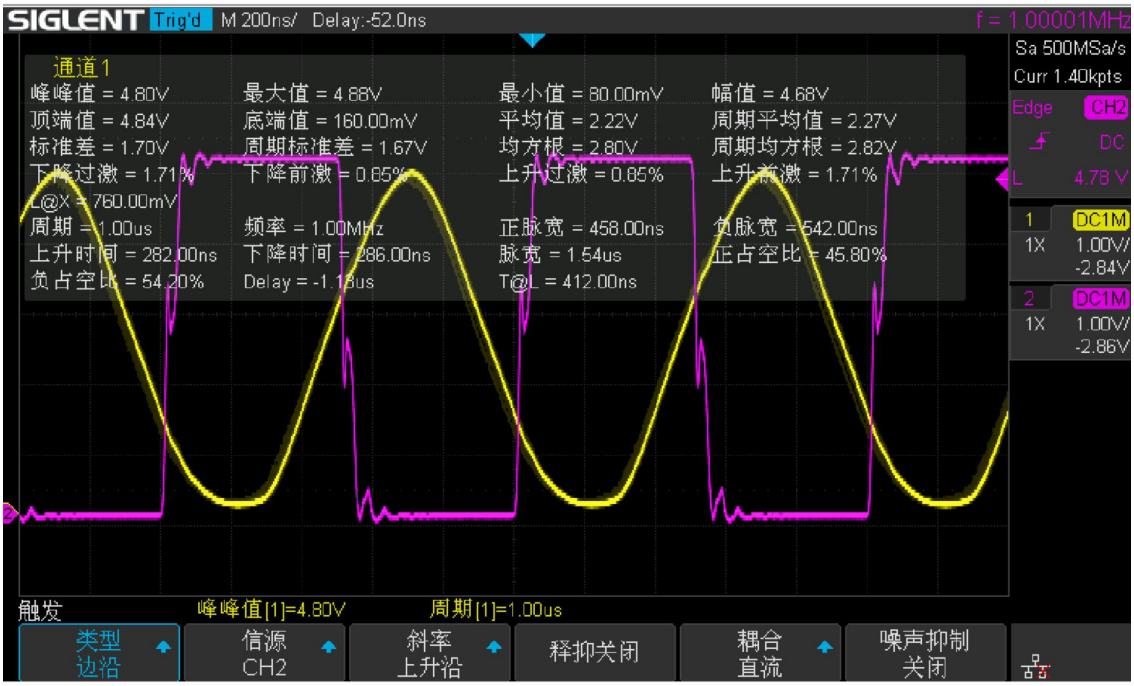


Figure7 Modulation Depth Test Graph
(Purple: A 1 MHz square wave signal input ranging from 0V to 5V, tested with a 10 Ohm load;
Yellow: The curve representing the actual current decay to 90% of its initial value)

7.4 Modulation Bandwidth（3dB）

Figure8 Modulation Bandwidth Test Diagram
(Purple: A 2 MHz sinusoidal signal input ranging from 0V to 5V, tested with a 10 Ohm load;
Yellow: The curve representing the actual current response after a 3dB drop)

7.5 Temperature Drift Test（VCS100）

Load Resistance（Ω）	Temperature（℃）	Current(A)
10	-20	0.0415605
10	-10	0.0415805
10	10	0.0416017
10	20	0.0416302
10	30	0.0416501
10	40	0.0416751
10	50	0.0417005
Temperature Coefficient (ppm/℃)		**47.08**

7.6 Temperature Control

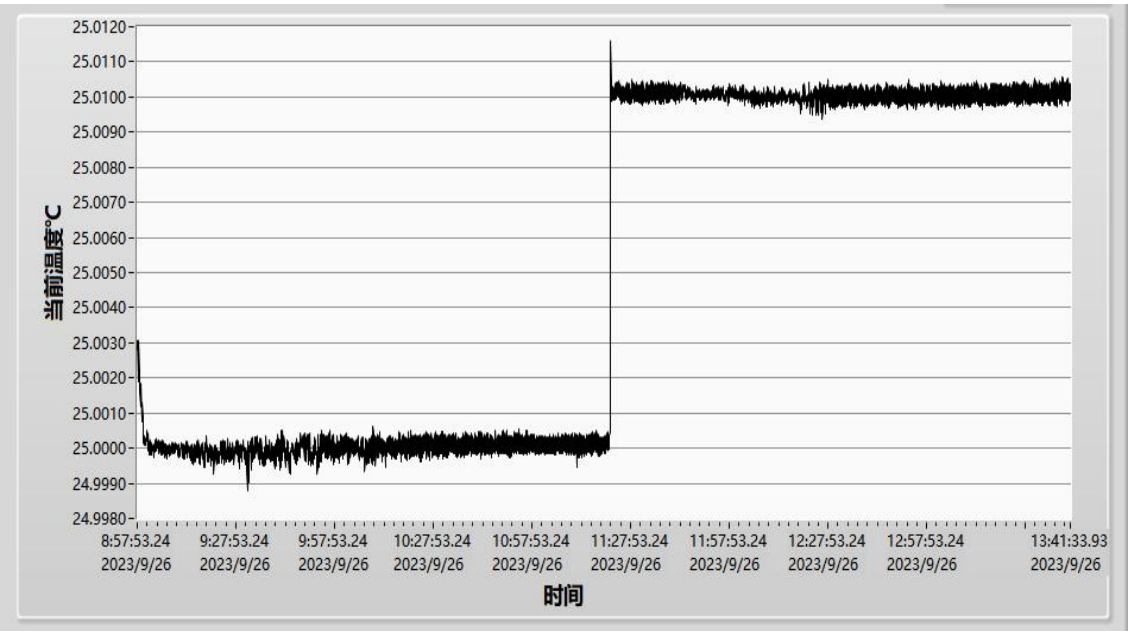


Figure9 Laser Temperature Control Performance

08 Instructional Video

【SenseFuture】Laser Diode Driver Board (LC) Instructions for Use

https://www.youtube.com/watch?v=9Inqp59vEdg

Partners

01 Universities and Research Institutes

清華大學 Tsinghua University
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中国科学院大学 University of Chinese Academy of Sciences
THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學
中国科学院半导体研究所 Institute of Semiconductors,Chinese Academy of Sciences
中国科学院 长春光学精密机械与物理研究所 Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences
中国计量科学研究院 National Institute of Metrology,China

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SenseFuture

Original Aspiration Determines the Future, Innovation Creates Value, Sharing Unites Hearts.

Looking forward to achieving win-win cooperation with you!

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SenseFuture Technologies Co., Ltd.