



Electro Optical Components, Inc.

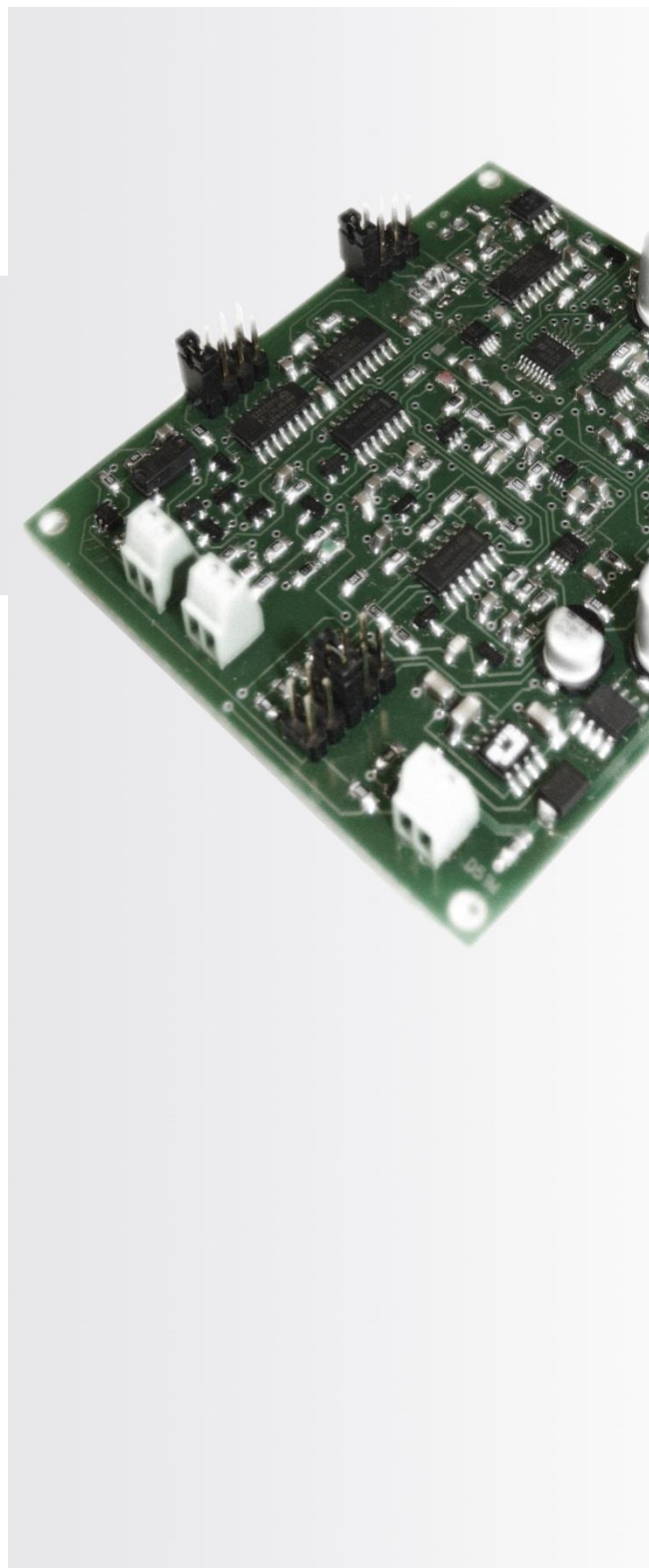
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D-51 UNIVERSAL LED DRIVER INSTRUCTION MANUAL



rev. 070415

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GENERAL INFORMATION

Application

D-51 driver is designed for power supply of Mid-IR LEDs.

Compatibility table

One-element LED models	
LmsXXLED	✓
LmsXXLED-R	✓
LmsXXLED-RW	✓
LmsXXLED-TEM	✓
LmsXXLED-TEM-R	✓
Standard multielement LED models	
LmsXXLED-4M	✓
LmsXXLED-4M-R	✓
LmsXXLED-4M-RW	✓
LmsXXLED-4M-TEM	✓
LmsXXLED-4M-TEM-R	✓
Lms18-..-23LED-6M	✗
Lms18-..-23LED-6M-TEM	✗

Note! Please contact us to specify compatibility of custom multielement LED models.

Features

- **Pulse mode operation** (mode that provides **maximum peak optical power**).
- **Adjustment** of LED current amplitude, frequency and pulse duration via driver's jumpers.
- **Synchronisation input** terminal block which allows:
 - **synchronising** driver with an external device (synchronous detector etc.);
 - **synchronising** two or more drivers simultaneously;
 - **setting custom** frequency of the LED signal.
- Possibility of **synchronisation** with an **external device** with the help of **synchronisation output** terminal block.
- **Safety system** for prevention of LED damage in case of **circuit brake**.
- **Temperature observation** – possibility to judge LED p-n junction temperature changing by observing voltage changing using current-voltage dependence.

Operation conditions

Indoor operation only. Ingress Protection Rating IP00.

PRECAUTIONS

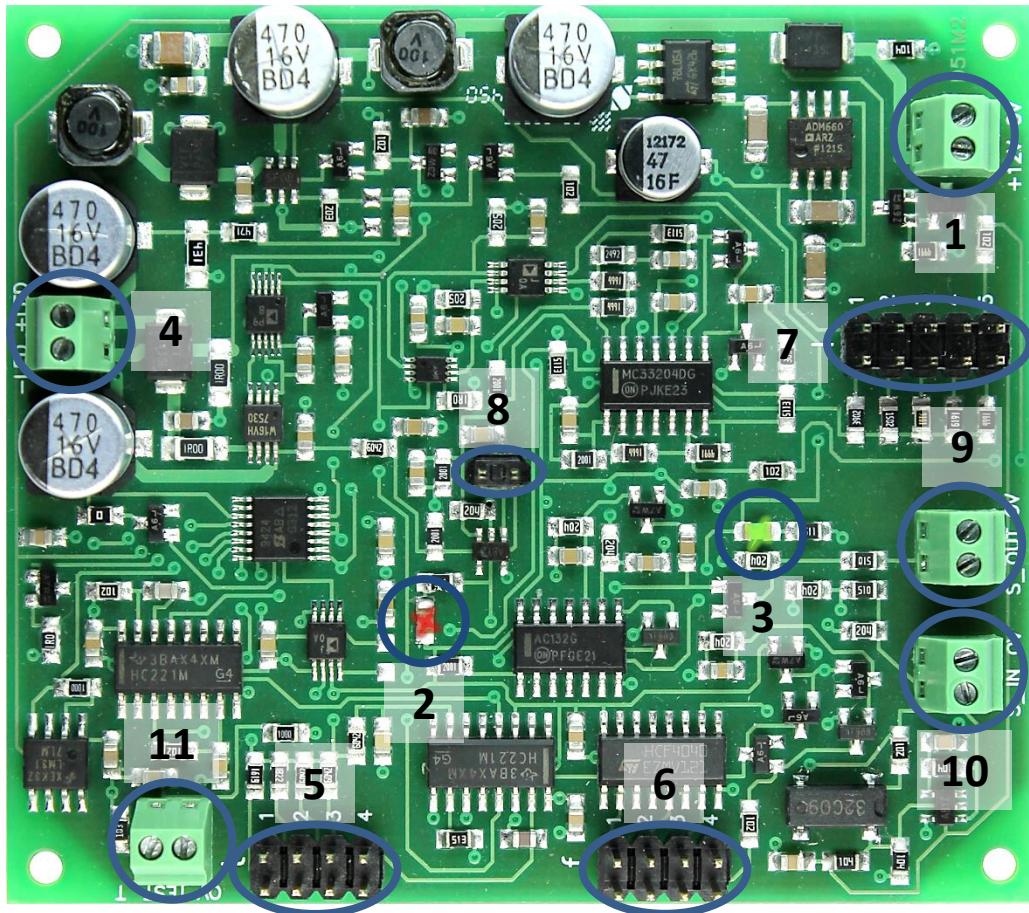
- Do not switch jumpers during work.
- Do not turn on the driver without jumpers inserted.
- Do not use multimeter to control and adjust current.
- Please keep the following driver's regimes listed in the table below. Otherwise excessive load may cause overheating and LED damage.

		Frequency			
		512 Hz	2 kHz	8 kHz	16 kHz
Pulse duration, μ s	2	1.9	1.9	1.5	0.6
	5	1.9	1.9	0.6	0.2
	10	1.9	1.5	0.2	0.2
	20	1.9	0.6	0.2	0.2

Maximum allowed current at different operation modes (frequency and pulse duration).

Note! Please refer to your provider if you have any questions.

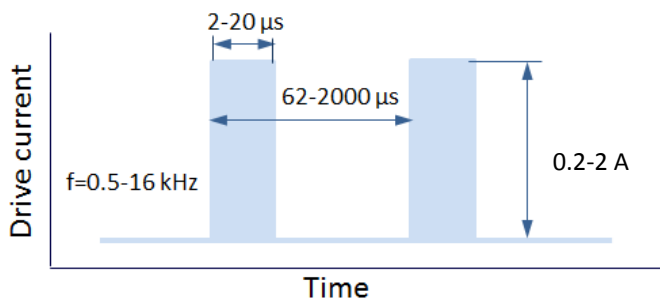
DRIVER LAYOUT



1. Power input terminal block.
2. Circuit break indicator (red).
3. LED current indicator (green).
4. LED connection terminal block.
5. Pulse duration adjustment jumper.
6. Frequency adjustment jumper.
7. LED current adjustment jumper.
8. Circuit break safety system disabling jumper.
9. Synchronization output terminal block.
10. Synchronization input terminal block.
11. Temperature observation voltage output terminal block.

OPERATING MODE DESCRIPTION

D-51 driver works in a **pulse mode**. This mode provides LED maximum peak optical power. LED current can be changed switching the jumper 7 (0.2; 0.6; 1.0; 1.5 and 1.9 A). Pulse duration can be changed using the jumper 5 (2; 5; 10 and 20 μ s). Frequency of an LED can be adjusted using the jumper 6 (512 Hz, 2 kHz, 8 kHz or 16 kHz). Frequency can be also adjusted by an external signal source connected via synchronization input.



Pulse mode current-time relation.

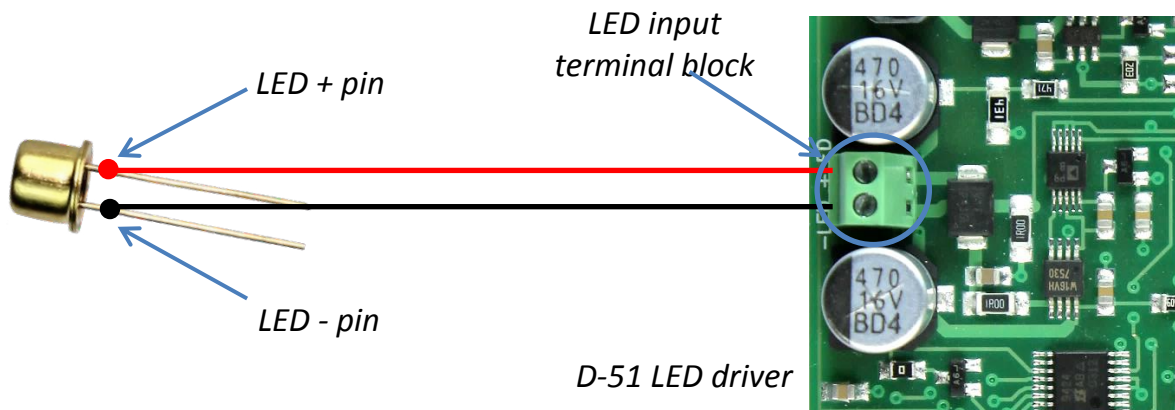
Note! When external signal source is connected to the synchronization input, frequency of an LED is determined by this source and NOT by the jumper. External signal should meet the following requirements:

Pulse duration	>10 μ s
Frequency	0.5 – 16 kHz
Pulse voltage amplitude	5 V

Note! You can stop driving the LED temporarily by putting external signal with **5V constant voltage** on synchronization input.

OPERATING INSTRUCTIONS

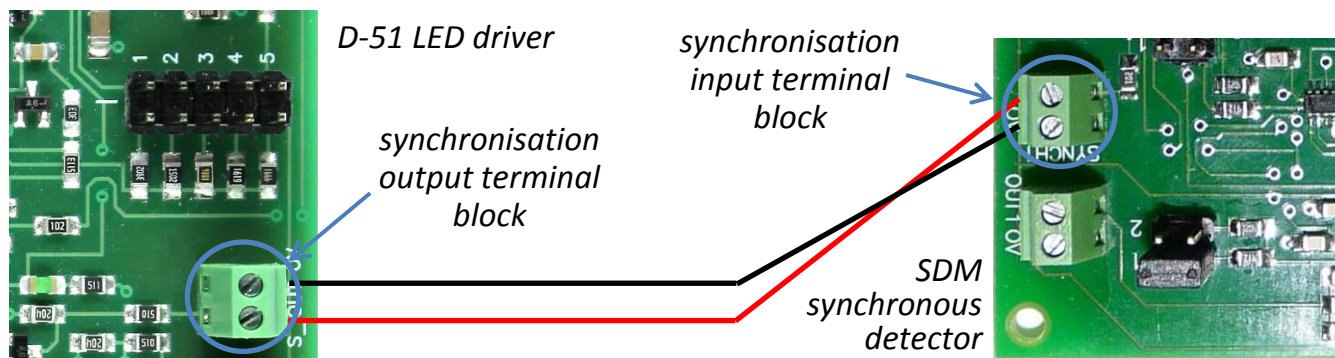
1. Carefully connect appropriate pins of the LED with LED connection terminal block (4) till tight fixation.



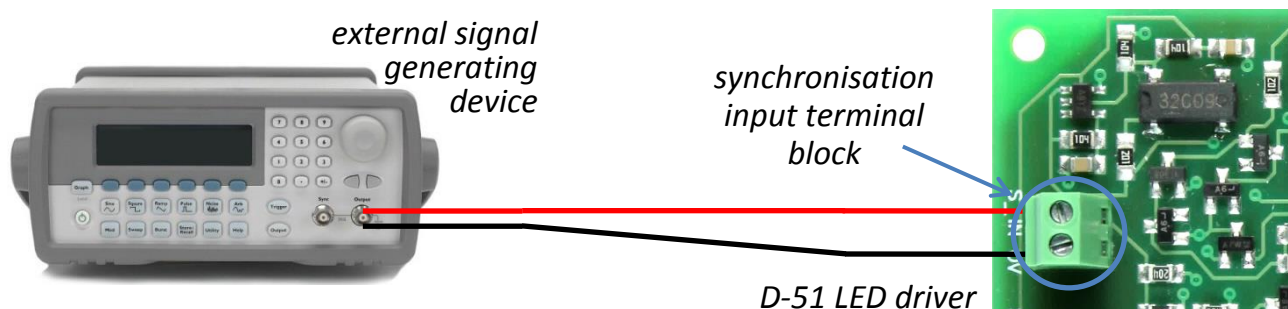
Note! Terminal block header marked with “LED +” must be connected to the appropriate pin of an LED (marked with a red point). Improper connection may cause LED damage.

Note! LED case must be electrically isolated from the ground.

2. Connect driver's synchronization output terminal block (9) with synchronisation input of LMSNT SDM synchronous detector or other synchronisation device.

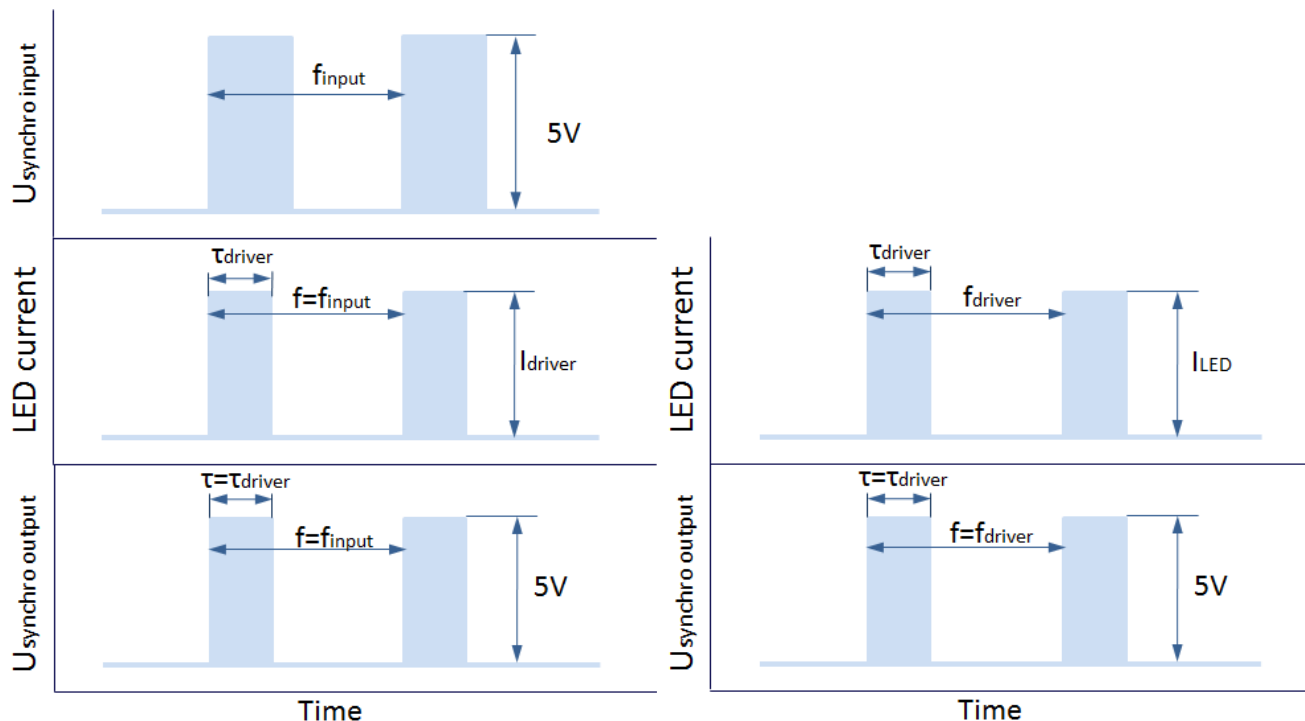


3. **(Optional)** Connect an external signal generating device with synchronization input (10) External signal should meet the requirements presented on the page 6.



OPERATING INSTRUCTIONS

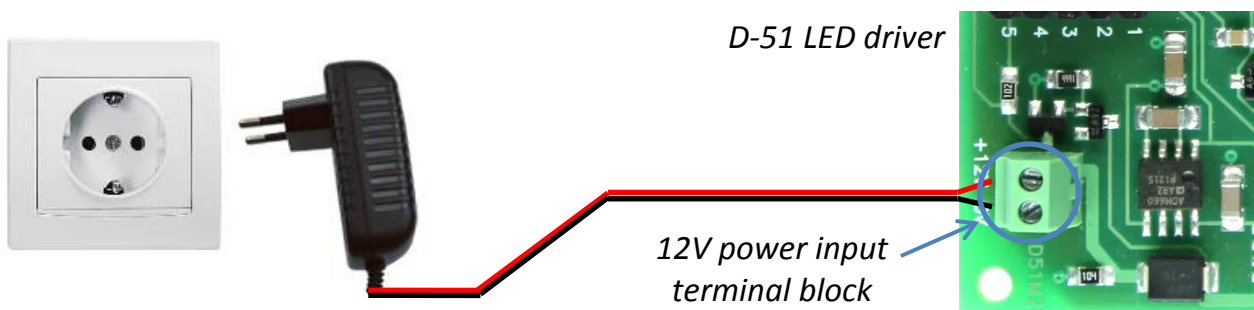
Note! Regarding the resulting signal forms in different conditions please refer to the graph below:



D-51 signal synchronisation with BOTH synchronisation input and synchronisation output

D-51 signal synchronisation with synchronisation output

4. Select required mode using pulse duration, frequency and LED current adjustment jumpers (5, 6 and 7 respectively). In case of using an external signal source frequency will be adjusted via the source.
5. Check that the circuit break safety system is turned on – jumper (8) should be put on.
6. Connect a power supply to the power input (1). LED current indicator (green) (3) will turn on if everything is connected properly. In case of circuit break red indicator (2) will turn on and LED current indicator (3) will be pulsing till the problem will be solved.



OPERATING INSTRUCTIONS

Note! Circuit break safety system triggers when operation voltage exceeds 2.5V. Subsequently, the system may turn on in case of using of LED models with high voltage values (some LEDs with peak wavelengths at 1.6-2.4 μm) despite proper connection. If the problem occurs take the following steps:

- make sure that voltage of an LED is more than 2.5V at chosen working current, referring to the appropriate LED current-voltage characteristic pointed in the technical report;
- check that all the connections are proper and secure
- put off the jumper (8) to disable the safety system.

7. To observe the temperature connect any voltage measuring device to temperature observation voltage output terminal block (11). Note that since every LED has a unique current-voltage characteristic (it can be found in appropriate LED technical report), correspondence between output voltage and temperature will be different depending on measured LED.

Note! If temperature control and/or thermostabilisation are required, please use TCM thermocontroller. For more information please refer to the appropriate datasheet.

8. Make all the connections of other boards (synchronous detector, thermocontroller etc.) following the appropriate instructions manuals. Before turning them on check the required connections and modes:

Synchronous detector:

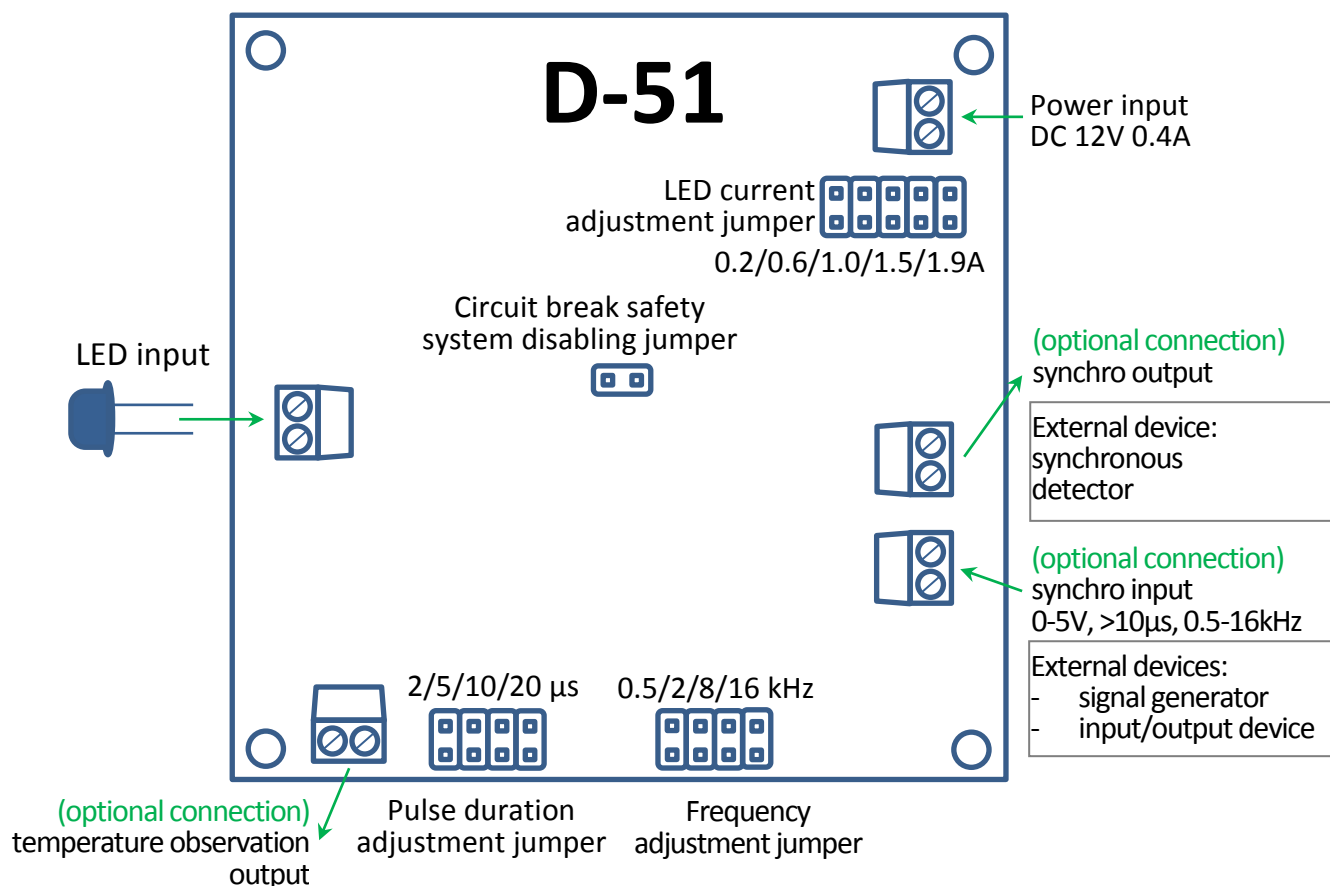
- Photodiode input connection
- Preamplifier power output connection
- Synchronisation with driver
- Averaging time and signal gain selection
- External signal observing device connection

Thermocontroller:

- Thermistor/D-51 temperature observation block input connection
- Thermocooler output connection
- External connections (if necessary)

Note! Please follow the requirements presented in the table on the “Technical Characteristics” page to provide driver’s faultless operation.

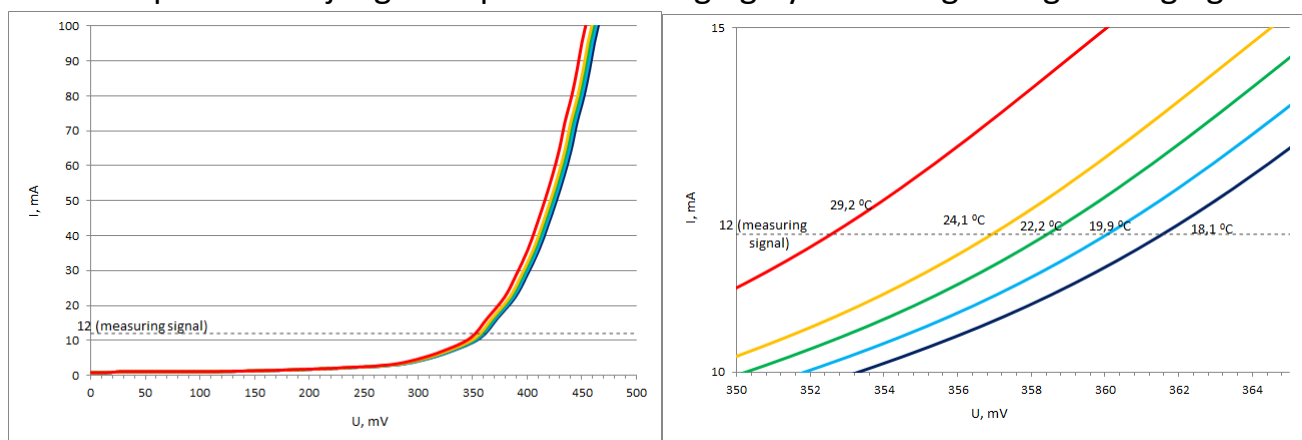
DRIVER CONNECTIONS



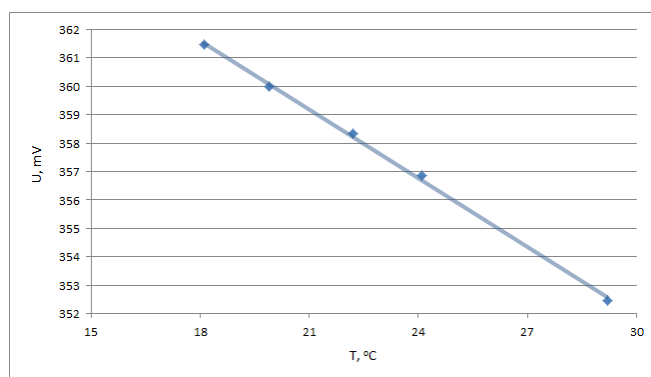
D-51 connections

ABOUT TEMPERATURE OBSERVATION*

Temperature observation is a possibility to define LED p-n junction temperature and observe temperature changing using current-voltage dependence. Driver generates low current signals with amplitude 12 mA and duration 500 ns for plugged LED. These signals are placed between driving signals and don't affect LED temperature. Special block of D-51 driver registers the pulse voltage value and converts it into constant voltage. Since there is a univocal dependence of voltage on intrinsic LED temperature it becomes possible to judge temperature changing by observing voltage changing.



Family of current-voltage characteristics at different temperatures.



*Voltage-temperature dependence at 12mA measuring signal.
Straight-line relationship is clearly seen.*

Every LED has a unique current-voltage characteristic, that's why relation between output voltage and temperature will be different depending on measured LED. Therefore, for measuring exact p-n junction temperature, the calibration for every LED is needed. To calibrate we recommend measuring voltage values at room temperature and some other temperature and use linear approximation ($U(T)=kT+b$).

** D-51 driver allows only observing temperature of an LED. If you need to control and adjust LED temperature, please use models with built-in thermocooler (LmsXXLED-TEM) and TCM thermocontroller.*

TECHNICAL CHARACTERISTICS

Input voltage	+12 V, stabilized
Voltage tolerance	-5..+5 %
Input current	max. 0.3 A
Board dimensions	80×70×15 mm
Synchronization output voltage	5 V

Adjustable parameters	
Pulse duration	2/5/10/20 μ s
Frequency	0.5/2/8/16 kHz
Output current amplitude	0.2/0.6/1.0/1.5/1.9 A