



# CURRENT SOURCE FOR LED TESTING

CS-035, CS-200

## Datasheet



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## DOCUMENT INFORMATION

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12	Kebo Michal	15. 09. 2017	New template document transformation
13	Navrátil Josef	30. 01. 2018	Snapshots and order numbers update
14	Navrátil Josef	16. 01. 2020	Revision of parameters and texts

### Attachments

### Notes

Datasheet is valid for firmware version 1.3.4 and higher.

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**Okomentoval(a): [L1]:** Zvažovali jste, zda nemít pro anglické manuály anglickou verzi e-mailové adresy, aby tomu zákazníci rozuměli?

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## 1 KEY FEATURES

- Power for single LED or light modules
- Adjustable current output – two range options
  - 25 mA – 350 mA
  - 100 mA – 2 A
- Output voltage up to 50 V DC with 24 V DC power supply
- LED current measurement
- LED voltage measurement
- Binning resistor and NTC measurement
- Ethernet interface for PC control
- Text (ASCII) communication protocol
- Autonomous mode of operation – controlled just with digital inputs and outputs from PLC
- Source status signalization with LEDs placed on front panel
- Possibility of powering more LED strings with common cathode individually using several current sources
- Minimum current ripple and LED brightness fluctuation during optical test
- Low current overshoot while shorting LED
- Overheat protection



Fig. 1 – Current source

## 2 PRODUCT DESCRIPTION

Current source is designed as power supply and test equipment for single LED or strings (modules), which does not contain circuits for current regulation. It is possible to set required current and measure voltage on LED with simple text commands. For both current and voltage there are adjustable limits which prevents exceeding LEDs maximum ratings.

In addition to standard mode with PC communication, current source offers autonomous mode too. Required current and limits are set before testing and stored in memory. Tests are started with digital inputs; current source then evaluates if the LED module is in range of limits and signalizes the result (OK/NOK) with digital outputs.

For modules containing more LED strings with common cathode it is possible to use simultaneously several current sources and set their currents individually. For current regulation the anode voltage is changed while cathode stays at the same potential.

Okomentoval(a): [L2]: Nemá zde být spíše „piece“ (coby kus)?

Okomentoval(a): [JN3R2]: Asi ano, ale vzorek je myslím také použitelný.

Current source works linearly, not in switching mode, this is a reason of power loss and device may become hot. It has only a passive aluminum heatsink on side, please note this fact during installation to distribution board. Main advantage of linear current source is extremely low ripple of output current, which reduces LEDs brightness fluctuation during optical test.

3 MOUNTING AND INSTALLATION

Case contains standardized mount for DIN rail, width of device including heatsink is 61 mm. There must be left free space around heatsink for air circulation, minimal distance of next device is 25 mm. Especially in case of using more current sources in one distribution board power loss and heating must be considered. According to settings and operation mode the power loss can temporarily achieve the maximum **input power** stated in chapter 7. The current source must be mounted on the DIN rail always with the red latch down.

Okomentoval(a): [L4]: Z důvodu zachování terminologie v kapitole 7

4 TERMINALS AND INDICATORS

LED	State	Meaning
Green (PWR)	light	Source is powered on and ready for communication.
	blinking	Output is enabled and source is supplying power to the load according preset parameters.
Red (ERR)	light	Reading of calibration data failed. The device uses default values.
	blinking	An error caused by overheating, unsuccessful completion of a self-test or by an abnormal value of some operating parameters.
Orange (LIM)	light	Some of measured values (voltage, current) exceed limits and output is turned off. Settings must be revised and output enabled again.

Tab. 1 – Description of LED indicators



Fig. 2 – Front panel



Fig. 3 – Right side of device

Terminal	Description
GND	Common ground – input and output ground are internally connected
VOUT	Output voltage – LED anode
GND	Common ground – input and output ground are internally connected
VIN	Input voltage

Tab. 2 – Terminal for power supply and output



Fig. 4 – Left side of device

Terminal	Description
GND	Common ground
NTC	NTC measurement
GND	Common ground
RBIN	Binning resistor measurement
GND	Common ground
DO0	Digital output 0
DO1	Digital output 1
DI1	Digital input 1
DI0	Digital input 0
IO GND	Galvanically isolated ground for digital inputs and outputs
IO PWR	Power for digital inputs and outputs

Tab. 3 – Terminal for resistor measurement and for digital inputs/outputs

## 5 TYPICAL APPLICATION

Following schematics shows connection of power supply, inputs and outputs. Ethernet connection is not drawn.

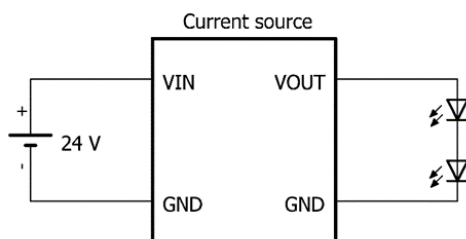


Fig. 5 Single LED string connection

Schematic on Fig. 5 is suitable for any number of LEDs if the sum of all forward voltages increased by regulation reserve (recommended 4 V) does not exceed maximum source output voltage (50 V DC). In practice it is possible to power LEDs up to ca. 46 V.

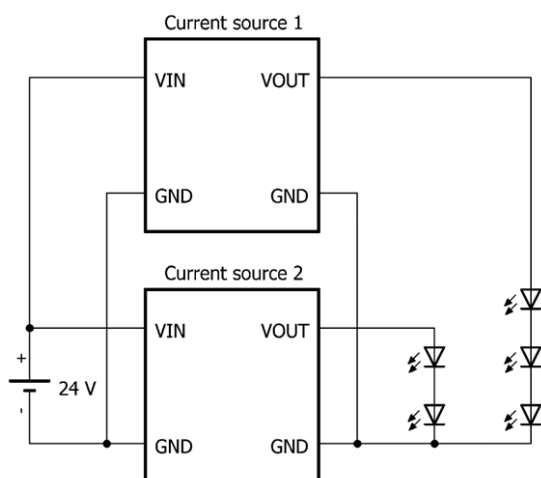


Fig. 6 Connection of two LED strings with common ground

Two and more LED strings with common cathode must be connected as shown on Fig. 6. For maximum count of LEDs is applied same rule as for single string on Fig. 5.

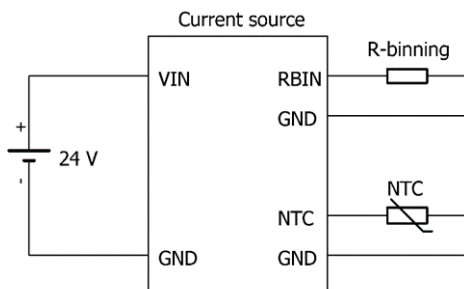


Fig. 7 Binning resistor and NTC measurement

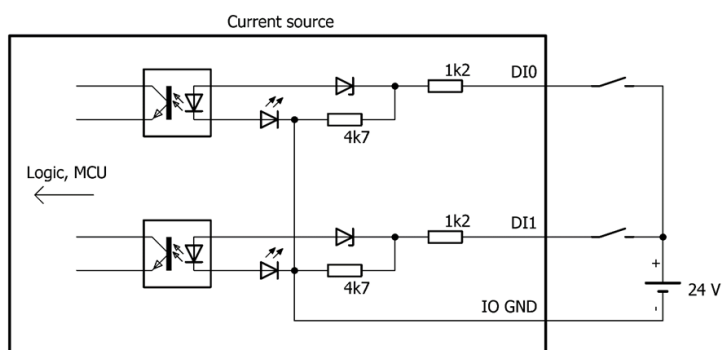


Fig. 8 Digital input connection

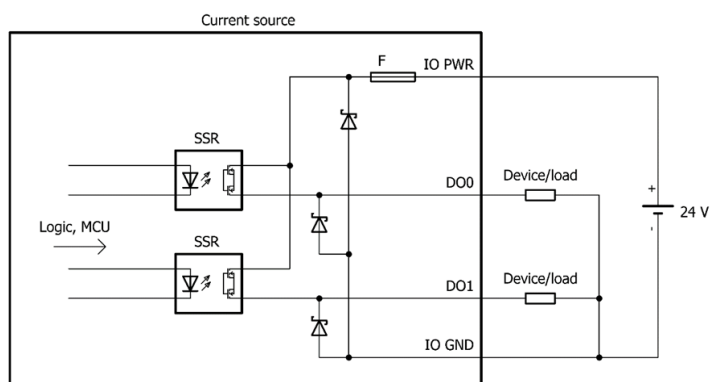


Fig. 9 Digital output connection



## 6 CIRCUIT WITH VOLTAGE OFFSET

To achieve an output voltage of up to 60 V, a voltage offset of 15 V can be used, while other catalog parameters remain the same. Principle and conditions of use:

- Current source output voltage 45 V + voltage source 15 V DC.
- 5 V from the current source catalog range is used as a reserve for current regulation.
- The entire circuit must be grounded only on the input (power side) as it is not possible for the LED cathode to be connected to ground.
- The output of 15 V supply must be galvanically isolated from the AC input.
- The output voltage measurement will always be decreased by 15 V offset since only the voltage between VOUT and GND terminals is measured.
- If the current source output is turned off, there is a short circuit between the VOUT and GND terminals.
- The sum of forward voltages of the tested LEDs must be higher than the offset of the voltage source, otherwise the LED will light up when the output of the current source is switched off (short-circuited).
- The offset power supply must be capable of continuously supplying the current required to power the LEDs. Given the current source range, it is advisable to select 15 V / 2 A.

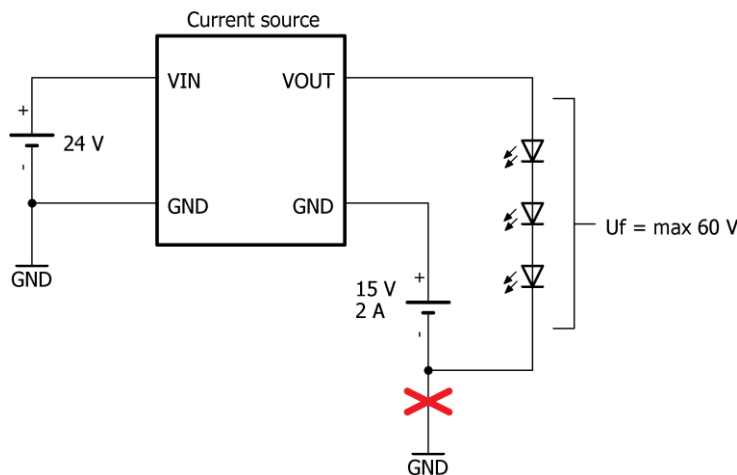


Fig. 10 Circuit with output voltage offset

**Okomentoval(a): [L5]:** Napěťový zdroj byl v textu zaměňován za „current source“, nemá dojít k náhradě i zde?

**Okomentoval(a): [JN6R5]:** Zde jde opravdu o napěťový zdroj, takže je to OK.

## 7 CHARACTERISTICS

All relative errors are referred to the value of measured quantity.

Parameter	Value	
Product	CS-035	CS-200
Output current range	25 mA – 350 mA	100 mA – 2 A
Output voltage <sup>(1)</sup>	2 V to 50 V DC	
Supply voltage	24 V DC $\pm$ 10 %	
Max. input power <sup>(2)</sup>	25 W	125 W
Idle power without load	4 W	4 W
Inrush current	40 A	
Measured values	output current, LED voltage, NTC, binning resistor	
Output current stability <sup>(3)</sup>	$\pm$ 1 %	
Current settings accuracy <sup>(4)</sup>	25 mA – 39 mA: $\pm$ 10 %	100 mA – 149 mA: $\pm$ 12 %
	40 mA – 199 mA: $\pm$ 5 %	150 mA – 249 mA: $\pm$ 8 %
	200 mA – 350 mA: $\pm$ 2 %	250 mA – 399 mA: $\pm$ 6 %
		0.400 A – 1.399 A: $\pm$ 4 %
		1.400 A – 2.000 A: $\pm$ 2 %
Output current ripple <sup>(5)</sup>	100 mA: < 0.5 mA p-p	1 A: < 5 mA p-p
	350 mA: < 2 mA p-p	2 A: < 10 mA p-p
Output voltage measurement accuracy <sup>(4)</sup>	3.00 V – 4.99 V: $\pm$ 10 %	
	5.00 V – 6.99 V: $\pm$ 7 %	
	7.00 V – 9.99 V: $\pm$ 5 %	
	10.00 V – 19.99 V: $\pm$ 3 %	
	20.00 V – 50.00 V: $\pm$ 1 %	
Binning resistor measurement range	3.3 k $\Omega$ - 20 k $\Omega$	
Binning resistor measurement accuracy <sup>(4)</sup>	$\pm$ 6 %	
NTC measurement range	10 k $\Omega$ - 70 k $\Omega$	
NTC measurement accuracy <sup>(4)</sup>	$\pm$ 6 %	
Communication interface	Ethernet 10Base-T/100Base-TX (Auto-Sensing)	
Communication protocol	textual (see user manual)	
Output capacitance	< 1 nF	
Current regulation technology	linear	
Protection	overpower and overheat	
Mounting	DIN rail (EN 60715)	
Dimensions	101 x 120 x 62 mm (without terminal counterparts)	
Power supply and output connection	screw terminals	
Weight	450 g	

Tab. 4 – Main characteristics

Okomentoval(a): [L7]: Předpokládám, že to je omyl

Okomentoval(a): [L8]: Všechna čísla v anglickém překladu by místo desetinné čárky měly mít desetinnou tečku.

- (1) In practice the maximum voltage is reduced by the regulation reserve - see chap. 5
- (2) Supply voltage 24 V. Actual power consumption depends on output current and parameter settings.
- (3) Provided the same temperature of source is maintained.
- (4) Source temperature 50 °C.
- (5) Source temperature 40 °C.

## 8 DIGITAL INPUTS AND OUTPUTS CHARACTERISTICS

Parameter	Value
Recommended DI voltage	24 V
Max. input voltage on DI	30 V
DI low level	< 7 V
DI high level	13 V – 24 V
DI current at 24 V	13 mA
Max. DO switching voltage	30 V DC
Max. DO switching current	200 mA

Tab. 5 – Digital inputs and outputs characteristics

## 9 ORDERING INFORMATION

Order number	Product code	Description
80140000	CS-035	Current source for LED testing, 25 mA – 350 mA
60263001	CS-200	Current source for LED testing, 100 mA – 2 A

Tab. 6 – Product options