INVENTRONICS

Setting the Output Current with Resistance

"Can I dim the output current of my 0-10V driver with a resistor or potentiometer?"

Technically, yes. The 0-10V dimming lines sustain approximately 10V with an open connection. Resistance can be added across the dimming leads to serve as a voltage divider, effectively lowering the output current. This connection is shown in Figure 1.

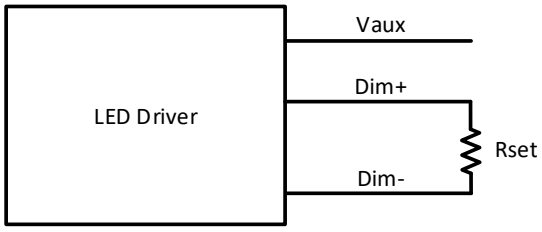

Figure 1: Wiring Diagram

Caution

It is not recommended to set the output current with resistance for everyday design and production. *Due to tolerances between individual drivers, the same resistance can result in different output currents on different drivers of the same model. Resistors and potentiometers also have tolerances, introducing even more deviation on the output.* For products needing a specific output current, we recommend our wide range of programmable drivers for best performance. The information in this note is intended to support situations where it is believed necessary to adjust the output current with resistance.

"What resistance do I need to set the output current?"

The resistance required will depend on the desired output current and the amount of current being sourced on Vdim (+).

The desired output current can be calculated as a percentage of the total output current. This percentage will correlate to a voltage on the 0-10V dimming leads (Vdim) as shown in Figure 2.

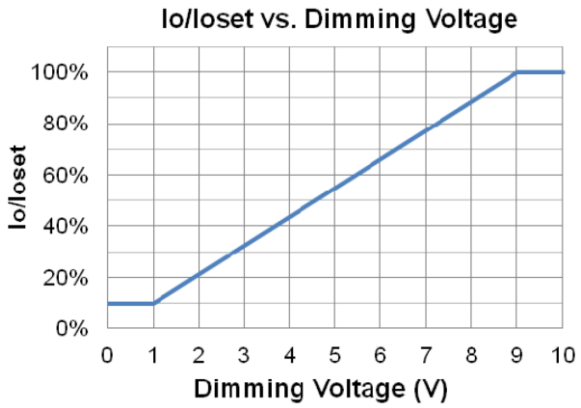

Figure 2: Output Current Percentage Dimming Voltage Correlation

The minimum output current percentage typically correlates with 1V and the maximum output current, or 100%, typically correlates with 9V. Though this curve can be referenced, Vdim can also be calculated using the following equations for drivers with a 10% minimum dim level and a 5% minimum dim level respectively:

$$Vdim = \frac{(8V)}{(90\%)}\ x\ (Set\% - 10\%) + 1$$

$$Vdim = \frac{(8V)}{(95\%)}\ x\ (Set\% - 5\%) + 1$$

The current sourced on the dimming leads *(Isource)* is specified under the "Dimming Specifications" of every datasheet, as shown below in Figure 3.

Source Current on Vdim (+) Pin	200 µA	300 µA	450 µA

Figure 3: Current Sourced on Vdim (+) Specification

Once the output current percentage and its correlated dimming voltage *(Vdim)* are defined, the resistance can be calculated using the following equation:

$$Rset = \frac{Vdim}{Isource}$$

If a design utilizes multiple drivers that all need to be set the same, a single resistance may be used. The current sourced on the dimming leads is additive, so the resistance will be divided by the total number of drivers' *(Dtotal)* dimming leads paralleled together:

$$Rset = \frac{Vdim}{Isource\ x\ Dtotal}$$

Quick Reference *Rset* Table

The **Appendix** includes a table that may be used as a quick reference to identify Rset.

Notice that the required resistance can vary dependent on the source current within the specified range. For best results, the source current is measured per individual driver and the correlated resistance is used. If the source current cannot be measured, please refer to the typical resistances that are highlighted in light blue.

Appendix Example

If using a single driver with a specified dimming source current of **200µA to 450µA** and a minimum dimming percentage of **5%,** the resistance required to set the output current to **70%** would be **21.58kΩ**

Note: please consider the caution outlined above.

Inventronics (Hangzhou), Inc
+86-571-56565800
sales@inventronics-co.com

Inventronics Europe
+31-857-470-061
eu-sales@inventronics-intl.com

Inventronics USA
+1-405-600-7480
usa-sales@inventronics-co.com

Appendix

Resistance to Set Output Current Percentage

Source Current on Vdim (+)	Minimum Diming Percentage	Output Current Percentage	1 Driver Source Current Range (μA)			2 Drivers Source Current Range (μA)			3 Drivers Source Current Range (μA)		
200μA to 450μA	10%		200	300	450	200	300	450	200	300	450
		100%	45	30	20	22.5	15	10	15	10	6.67
		90%	40.56	27.04	18.02	20.28	13.52	9.01	13.52	9.01	6.01
		80%	36.11	24.07	16.05	18.06	12.04	8.02	12.04	8.02	5.35
		70%	31.67	21.11	14.07	15.83	10.56	7.04	10.56	7.04	4.69
		60%	27.22	18.15	12.1	13.61	9.07	6.05	9.07	6.05	4.03
		50%	22.78	15.19	10.12	11.39	7.59	5.06	7.59	5.06	3.37
		40%	18.33	12.22	8.15	9.17	6.11	4.07	6.11	4.07	2.72
		30%	13.89	9.26	6.17	6.94	4.63	3.09	4.63	3.09	2.06
		20%	9.44	6.3	4.2	4.72	3.15	2.1	3.15	2.1	1.4
		10%	5	3.33	2.22	2.5	1.67	1.11	1.67	1.11	0.74
0μA to 250μA	10%		0	200	250	0	200	250	0	200	250
		100%	/	45	36	/	22.5	18	/	15	12
		90%	/	8.11	40.56	/	20.28	16.22	/	13.52	10.81
		80%	/	36.11	28.89	/	18.06	14.44	/	12.04	9.63
		70%	/	31.67	25.33	/	15.83	12.67	/	10.56	8.44
		60%	/	27.22	21.78	/	13.61	10.89	/	9.07	7.26
		50%	/	22.78	18.22	/	11.39	9.11	/	7.59	6.07
		40%	/	18.33	14.67	/	9.17	7.33	/	6.11	4.89
		30%	/	13.89	11.11	/	6.94	5.56	/	4.63	3.7
		20%	/	9.44	7.56	/	4.72	3.78	/	3.15	2.52
		10%	/	5	4	/	2.5	2	/	1.67	1.33
200μA to 450μA	5%		200	300	450	200	300	450	200	300	450
		100%	45	30	20	22.5	15	10	15	10	6.67
		90%	40.79	27.19	18.13	20.39	13.6	9.06	13.6	9.06	6.04
		80%	36.58	24.39	16.26	18.29	12.19	8.13	12.19	8.13	5.42
		70%	32.37	21.58	14.39	16.18	10.79	7.19	10.79	7.19	4.8
		60%	28.16	18.77	12.51	14.08	9.39	6.26	9.39	6.26	4.17
		50%	23.95	15.96	10.64	11.97	7.98	5.32	7.98	5.32	3.55
		40%	19.74	13.16	8.77	9.87	6.58	4.39	6.58	4.39	2.92
		30%	15.53	10.35	6.9	7.76	5.18	3.45	5.18	3.45	2.3
		20%	11.32	7.54	5.03	5.66	3.77	2.51	3.77	2.51	1.68
		10%	7.11	4.74	3.16	3.55	2.37	1.58	2.37	1.58	1.05
		5%	5	3.33	2.22	2.5	1.67	1.11	1.67	1.11	0.74

***Resistance values are in kΩ.**