CONTENTS

APPLICATION NOTES

Figures 1 to 3 show the standard configurations of iC-WK/L for N/P/M-type laser diodes. Due to the quick soft start, iC-WK/L can be pulsed up to approximately 1 kHz by simply switching the supply voltage on and off.

In particular with mechanical switches to turn the supply voltage on/off, it is of utmost importance to choose high enough values for C1 ($\geq$ 1 μF) and/or C2 to prevent the iC-WK/L from performing undesired safety shutdowns due to the bouncing contacts.

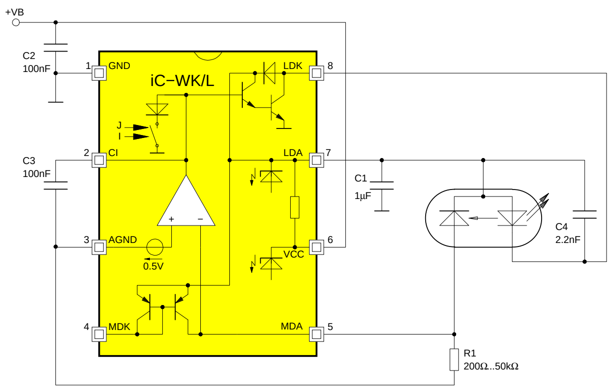

Figure 1: Configuration for N-type laser diodes (cathode MD at anode LD)

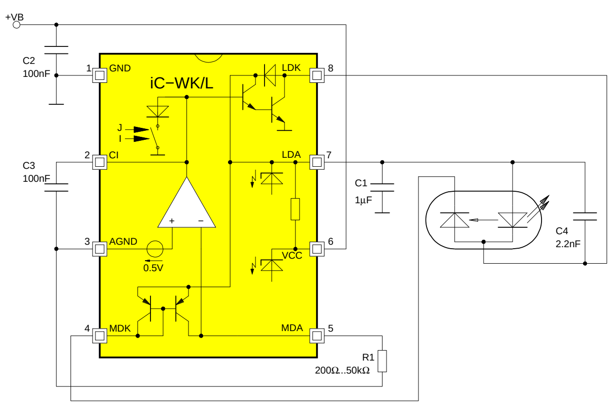

Figure 2: Configuration for P-type laser diodes (anode MD at cathode LD)

In Figure 4 the internal current mirror for P-type laser diodes is used for analog modulation. Thus the laser power can be dimmed by drawing current from pin MDK. For this task a controlled current source is best suited. If a voltage source is used (eg. a D/A converter) plus resistor (Rmod), the modulation current results from the voltage drop across Rmod divided by Rmod. The voltage at MDK calculates to $V(LDA) - 2 * V_{BE}$ (cf. iC-WK/WKL data sheet, Electrical Characteristics No. 108).

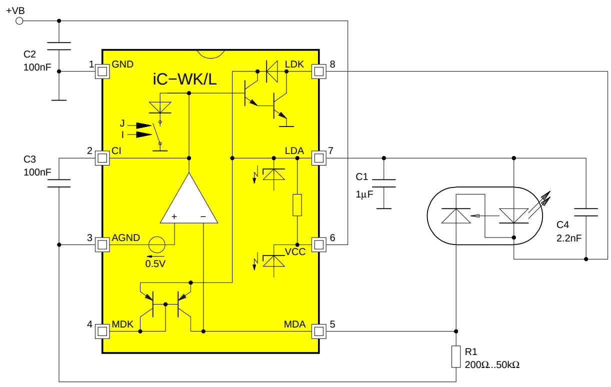

Figure 3: Configuration for M-type laser diodes (common cathode of LD und MD)

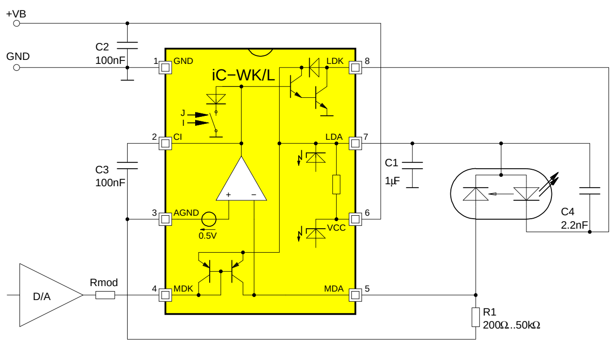

Figure 4: Using the second monitor diode input for analog modulation (N-type laser)

As shown in Figure 5, analog modulation is also possible via pin MDA, not only with a P-type laser diode. Again the modulation current results from the voltage drop across Rmod divided by Rmod. The voltage at MDA is 0.5 V. With iC-WK an additional blocking capacitor across R1 might be necessary (see also Figure 8).

Caution! In contrast to the circuit given in Figure 4, a laser power increase is possible.

This modulation principle can be utilised for most laser drivers, independent of the laser diode's pin configuration.

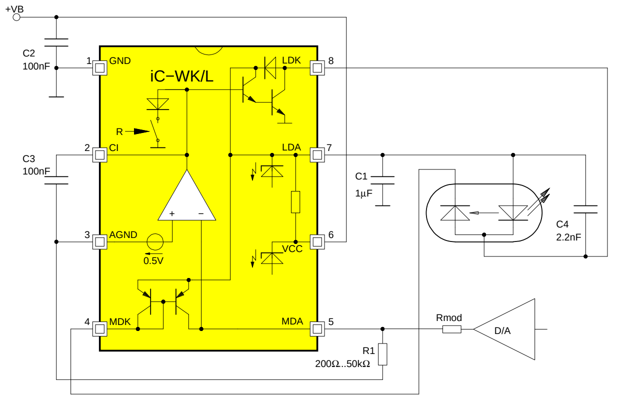

Figure 5: Analog modulation with a P-type laser

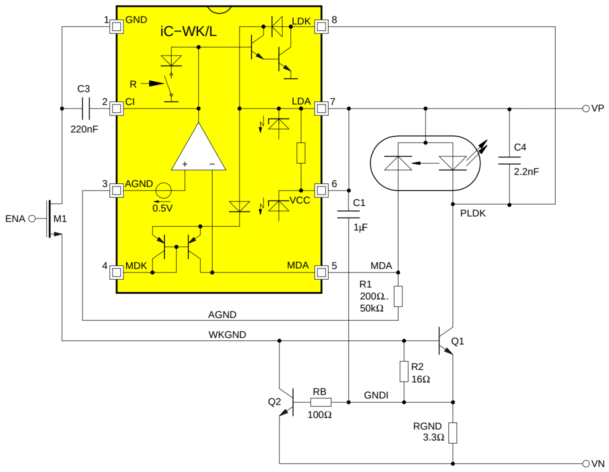

Figure 6: N-type circuit for higher laser currents

Figure 6 shows a circuit for higher laser currents. R2 sets the amount of current iC-WK/L handles. With R2 = 16 Ω and V_{BE}(Q1) = 0.7 V this gives approximately 44 mA (45 mA is ideal). RGND sets the overcurrent shutdown threshold. With RGND = 3.3 Ω and V_{BE}(Q2) = 0.65 V it results to 200 mA. These values have to be adapted according to the transistors used und the desired shutdown threshold. Q2 may be a general purpose small signal transistor like a BC237. Q1 must be chosen according to the required laser current eg. a BD139. With CMOS signals at pin ENA the circuit can be switched on and off.

Figure 7 shows a different circuit for higher laser currents, in particular for P-type lasers. Although the circuit shown in Figure 6 is also suited for P-type lasers, this circuit allows to connect the laser diode case (= common terminal) to the circuit ground.

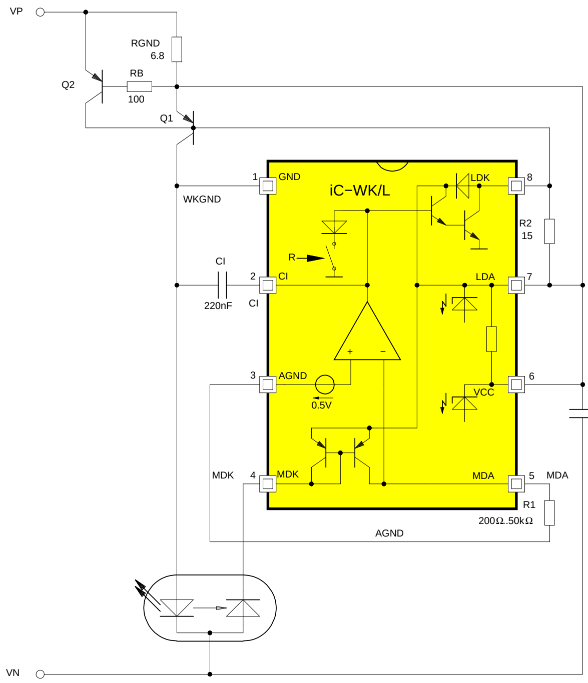

Figure 7: P-type circuit for higher laser currents

In a noisy environment the integrated safety power-down circuit (MDA monitor, iC-WK only) may be triggered unintentionally. Usually the noise finds its way into the system via the power supply or the leads from the driver to the laser diode. Therefore the power supply should be blocked accurately and the leads to the laser diode should be kept as short as possible. Should such a shutdown occur all the same, C5 can effectively suppress this. Since C5 slows down the feedback path of the regulator and thus might lead to oscillation, C5 must not exceed 47 pF and R1 25 kΩ. C3 must be increased to at least 220 nF. C1 should be chosen to 2.2 to 4.7 µF and must not be a tantalum type.

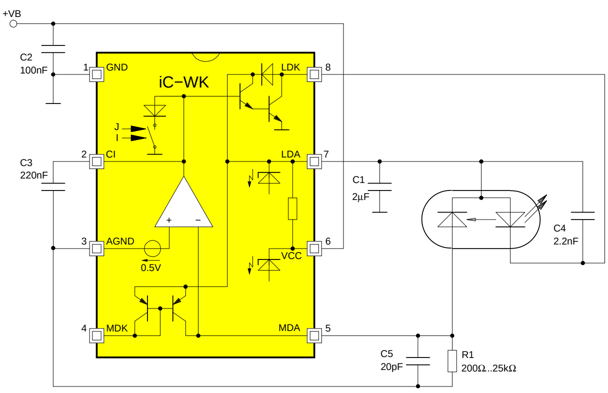

Figure 8: N-type circuit with filtering for noisy environments

DIMENSIONING

Device	Range	Note
R1	200 Ω...50 kΩ ca. 2 kΩ	Sets the laser power; select according to the laser diode. Example: R1 = V(MDA) / I(MD)@I(LD)nom = 0.5 V / 0.25 mA = 2 kΩ
R2	ca. 16 Ω	Sets the bias, select according to Q1. Example: R2 = V_{BE}(Q1)@I(LD)nom / 45 mA = 0.7 V / 45 mA = 15.56 Ω
RGND	ca. 3.3 Ω	Sets the overcurrent shutdown threshold; select according to Q2 and the desired threshold I(LD)off. Example: RGND = V_{BE}(Q2)@I(LD)off / I(LD)off = 0.65 V / 200 mA = 3.25 Ω
C1	100 nF...1 µF...	Ceramic filtering capacitor for the laser diode power supply
C2	(0)...100 nF	Optional, may be omitted with satisfactory filtering by C1
C3	22 nF...	Select according to laser diode and value of R1. Example: for a typical laser diode with I(LDK) = 35 mA and I(MD) = 0.25 mA 100 nF are sufficient.
C4	1 nF...10 nF	Optional, ceramic ESD protection capacitor
C5	(0)...47 pF	Optional, ceramic filtering capacitor
M1		Optional, switching transistor
Q1		Optional, small-signal or power transistor
Q2		Optional, small-signal transistor