TLE 4917/4913 Application notes

Version 1.0

1) Information about the application circuit of the TLE 4917.

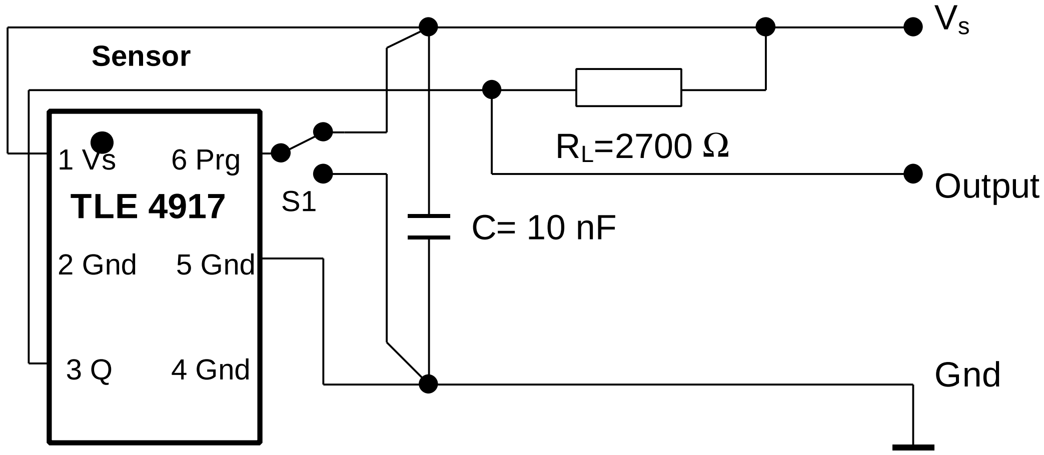

Fig. 1 Application circuit TLE 4917

The minimum value for the pull up resistor can be calculated with the power supply voltage V_s, the maximum current I_{Qmax} and the minimum output saturation voltage U_{QSAT}.
Example for V_s = 3 V:
$R_{Lmin} = (V_s - U_{QSATmin})/I_{Qmax}$ = (3 V - 0,1 V)/0,002 A = 1435 Ω

Larger values for R_L will reduce the current I_Q and therefore the power consumption. If the resistor R_L is very large (>100 kOhm) a capacitor (app. 10pF) between Output and Gnd pin could be useful if capacitive coupled noise occurs.
The load at the output Q should have a large input resistance to reduce the current trough R_L and the power consumption.

The TLE 4917 has 3 ground pins. From a mechanical point of view all ground pins should be connected to ground. Shortest wires should be used to avoid ground loops.

If there is a need to reduce the number of used ground-pins any ground-pin combination may me used. Furthermore it is possible using only one ground-pin at the application, all pins are equivalent.

The capacitor C is highly recommended to reduce noise on the power supply voltage and it will improve the EMI/EMC performance.
Furthermore it decreases the transient peak supply current during operation time. The IC toggles between low and high current consumption. This behaviour might produce additional noise at the power supply. The capacitor will reduce this noise.

Furthermore this capacitor is used to supply the sensor if microbreaks were (short loss of supply voltage) to occur.
Shortest connection wires between IC and capacitor should be used to avoid noise.

The switch S1 shows the programming feature of the output.
Example: If the PRG-pin is connected to V_S the IC will hold the output Q at a high voltage level for B= 0 mT in this circuit. A magnetic field larger than the operating point will switch the output to low level.
In typical applications the PRG-pin is connected directly to Vs or to Gnd depending on the technical needs. Avoid using a floating PRG-pin.

2) Information about the application circuit of the TLE 4913.

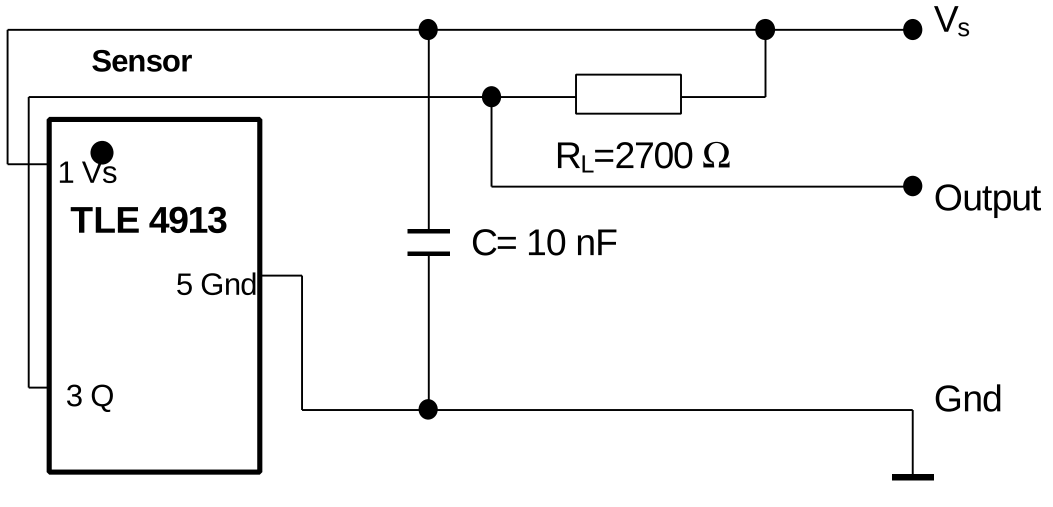

Fig. 2 Application circuit TLE 4913

The minimum value for the pull up resistor can be calculated with the power supply voltage V_s, the maximum current I_{Qmax} and the minimum output saturation voltage U_{QSAT}.
Example for V_s = 3 V:
$R_{Lmin} = (V_s - U_{QSATmin})/I_{Qmax}$ = (3 V - 0,1 V)/0,002 A = 1435 Ω

Larger values for R_L will reduce the current I_Q and therefore the power consumption. If the resistor R_L is very large (>100 kOhm) a capacitor (app. 10pF) between Output and Gnd pin could be useful if capacitive coupled noise occurs.
The load at the output Q should have a large input resistance to reduce the current trough R_L and the power consumption.

The capacitor C is recommended to reduce noise on the power supply voltage and will improve the EMI/EMC performance.
Furthermore it decreases the transient peak supply current during operation time. The IC toggles between low and high current consumption. This behaviour might produce additional noise at the power supply. The capacitor will reduce this noise.

Furthermore this capacitor is used to supply the sensor if microbreaks were (short loss of supply voltage) to occur.
Shortest connection wires between IC and capacitor should be used to avoid noise.

The TLE 4913 will switch the output to low-level if a magnetic field larger than the operating point occurs.

3) Remarks about the capacitor between Vs and Gnd.

The capacitor C is recommended to reduce noise on the power supply voltage and will improve the EMI/EMC performance.
Furthermore it decreases the transient peak supply current during operation time. The IC toggles between low and high current consumption. This behaviour might produce additional noise at the power supply. The capacitor will reduce this noise.

Furthermore this capacitor is used to supply the sensor if microbreaks were (short loss of supply voltage) to occur. Shortest connection wires between IC and capacitor should be used to avoid noise.

Measurements have been done to show:
A) The influence of the output resistance of the power source (battery) to the switching behaviour
B) The influence of a modulated voltage supply to the switching behaviour
These results might be important to choose a reasonable value for the capacitor C.

A) Influence of the output resistance (R_S) of a battery to the switching behaviour of the output signal. The serial resistor R_S has been varied (0-1 kOhm) and the voltage at pin V_s versus Gnd has been changed from 2,4 to 5,5V. The magnetic field was triangular with +/-10 mT amplitude. The pull up resistor R_L had been 2700 Ohm, the capacitor C 10nF.
Results:
The hysteresis and thresholds of the IC decreased for large resistors (1kOhm) slightly (100 µT). No major influence of the resistor Rs to the performance of the IC could be found.

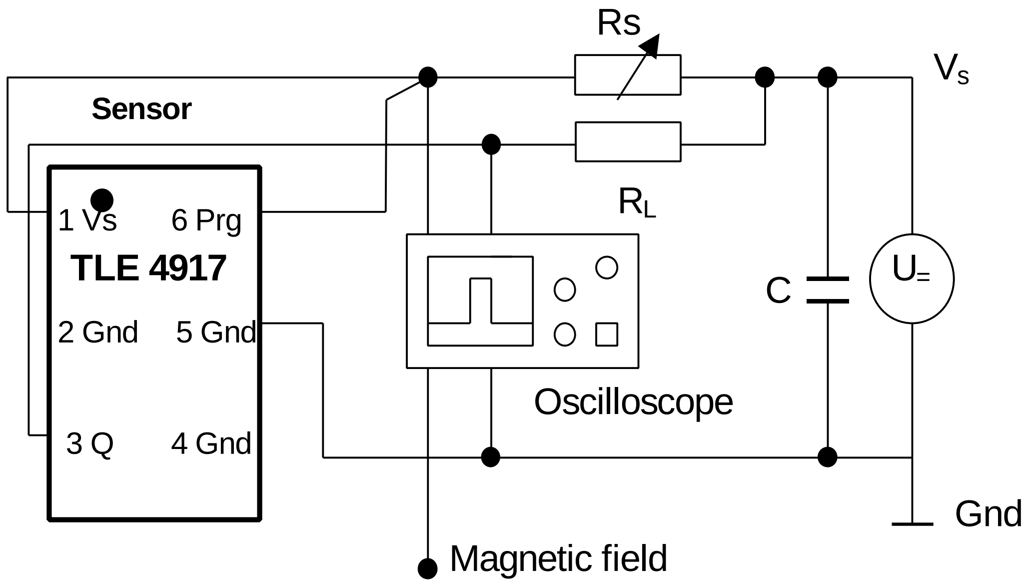

Fig. 3 Measurement circuit A for TLE 4913/17

B) Influence of a modulated power supply to the switching behaviour of the output signal.
The test voltage had a DC bias (minimum 2,4 V) and an additional amplitude and frequency varying rectangular voltage. Measurement has been done without a capacitor. An irregular output switching was found for frequencies around 600-800 kHz with a 2,4 V voltage supply and a rectangular voltage larger 0,3 V.
A slight decrease (100 µT) of the switching thresholds and hysteresis was monitored for frequencies between 5 and 10 MHz.
Higher DC voltage levels allowed a larger rectangular voltage. Adding the recommended capacitor stopped always the irregular output switching.

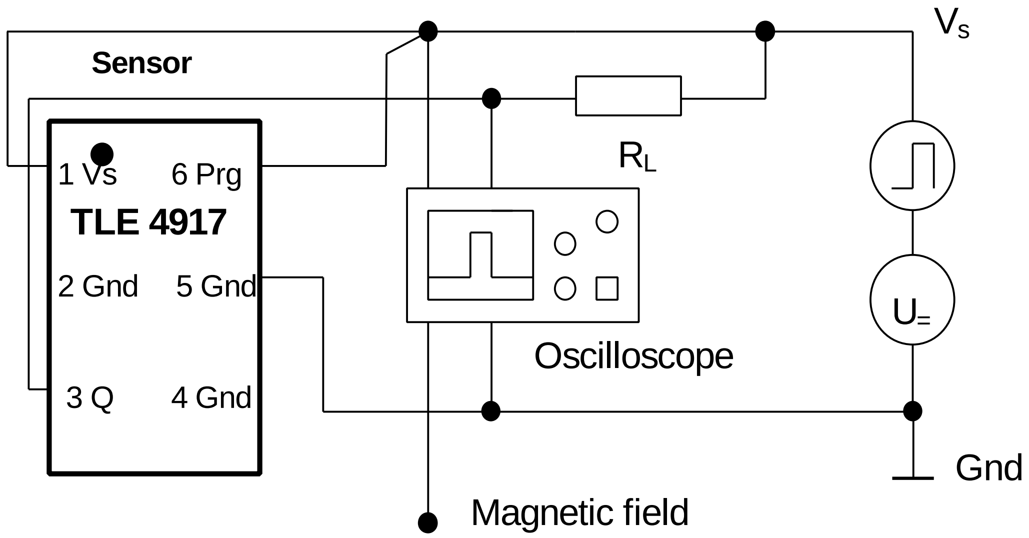

Fig. 4 Measurement circuit B for TLE 4913/17