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Application Note

TDC-GP30

Operation with a single transducer for concentration measurement

Content Guide

1 General Description

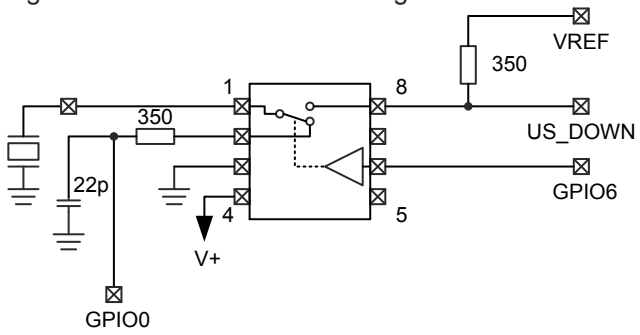
Concentration measurement targets an operation with a single transducer. The TDC-GP30 task management is dedicated to flow and therefore operation with a pair of transducers.

Thanks to the optional gas meter mode, it is possible to work with a single transducer.

2 Realization

This operation needs an external analog switch like Maxim MAX4659 as well as the external RC combination.

Figure 1: External circuit for a single transducer



The TDC-GP30 runs in gas meter mode, sending only in one direction only. In gas meter mode the fire burst is sent at pin GPIO0. The external circuit switches the transducer between GPIO0 (fire) and US_DOWN (receive).

Figure 2: Configuration

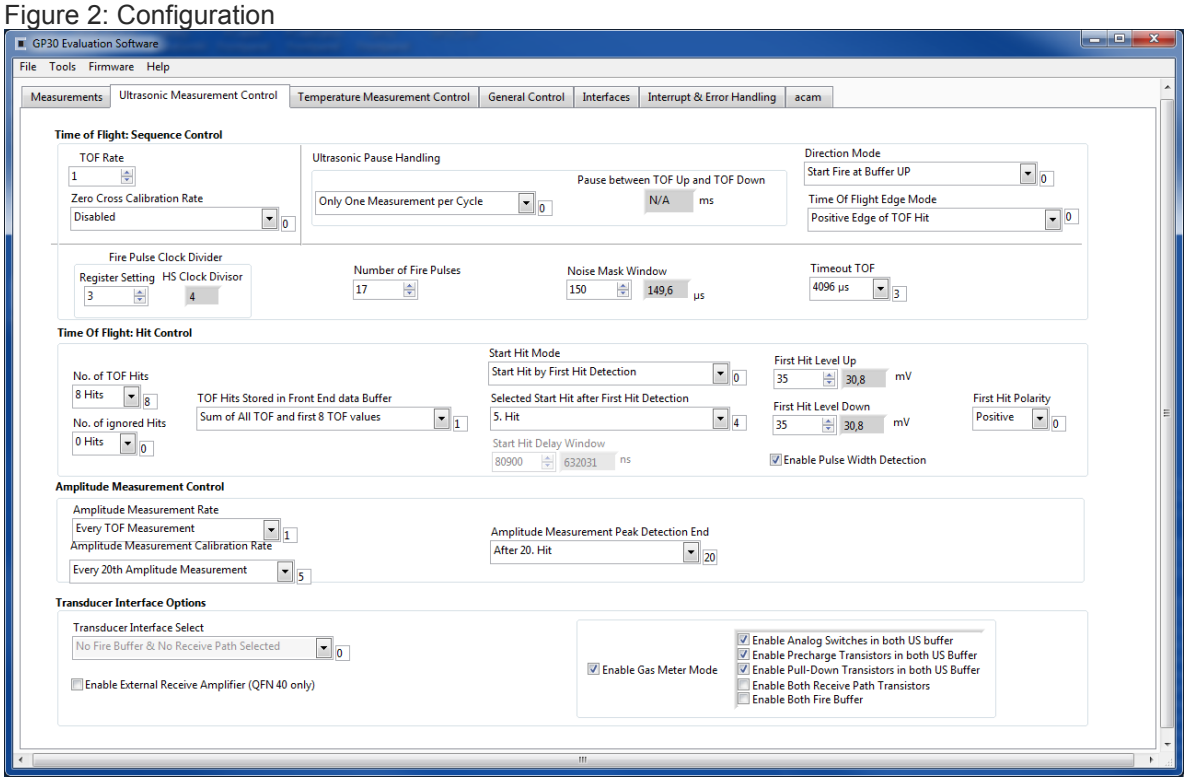
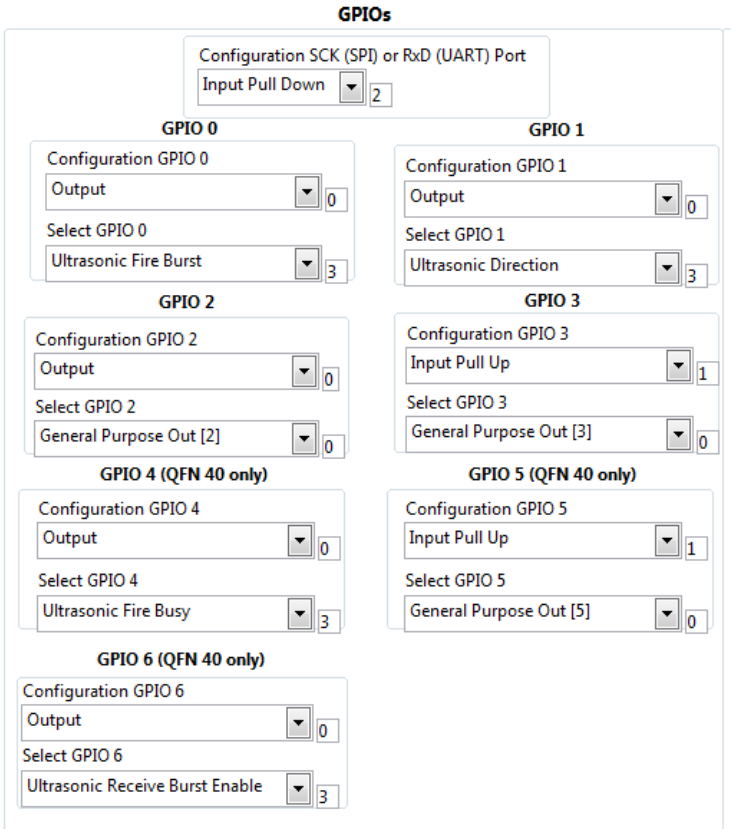


Figure 3: Configuration for GPIOs



With this setup, the signals look like shown in following figures.

Figure 4: Send and Receive signals

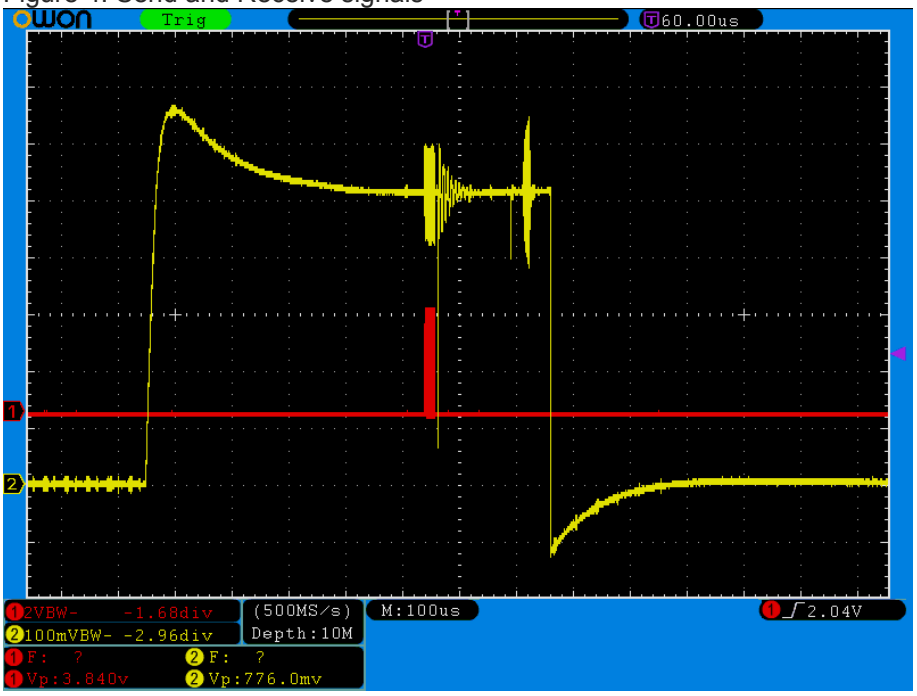
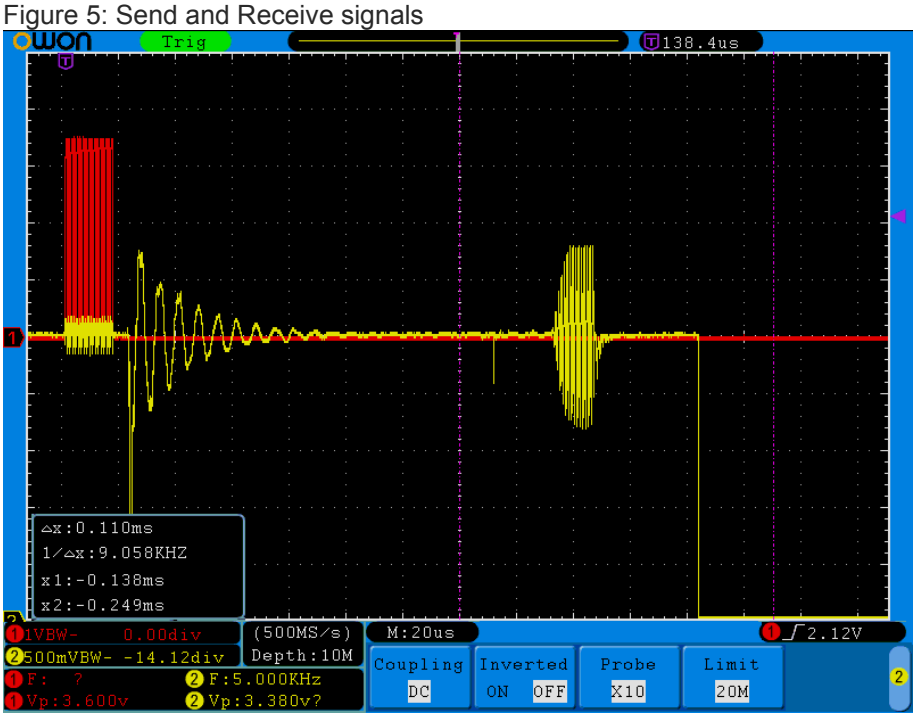


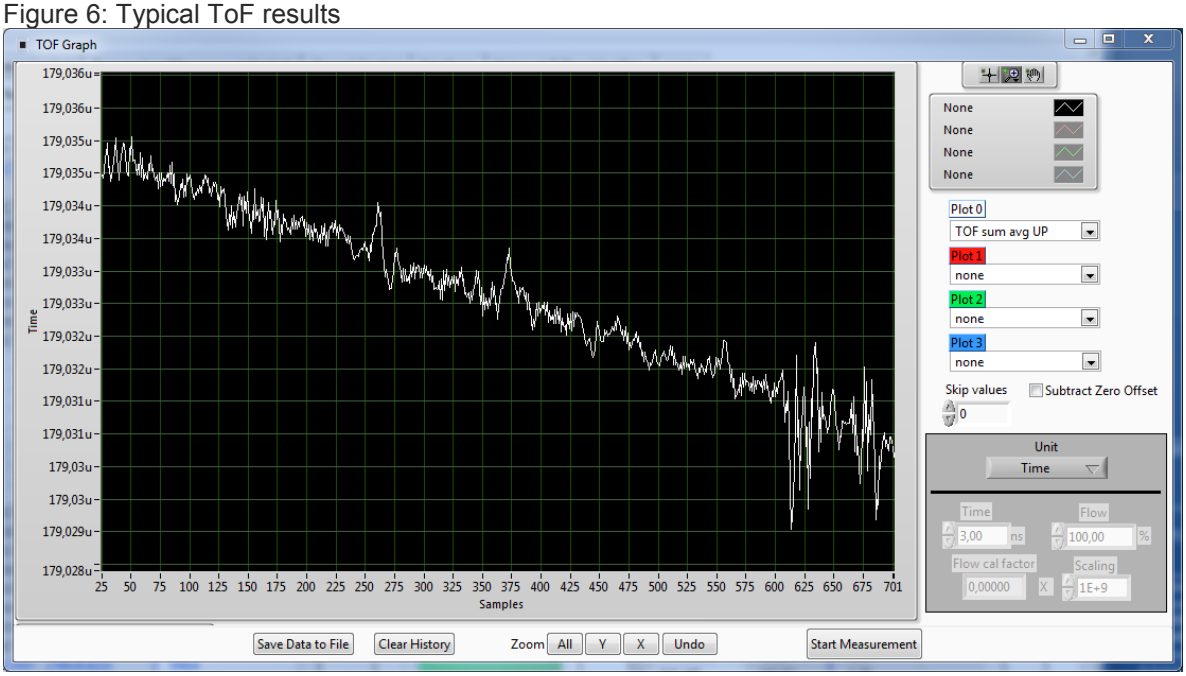
Figure 5: Send and Receive signals



It is obvious that the resonance of the transducers when switched to Vref for receive defines a minimum time-of-flight.

The resolution seen is in the order of 500ps rms with 10-fold average. Of course, the temperature affects the speed of sound and a drift is seen accordingly.

Figure 6: Typical ToF results



3 Conclusion

In principle, TDC-GP30 with an external analog switch can operate in a single transducer application. Of course, for a reasonable interpretation of the data an additional temperature measurement is necessary. Such a setup will be fine for concentration measurement. Level measurements will be hard to realize as the amplitude will vary dramatically with any waves on the reflecting surface so that first hit detection may not be applicable.

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6 Revision Information

Current revision 1-00 (2016-Oct-13)	Page
Initial version 1-00	

Note: Page numbers for the previous version may differ from page numbers in the current revision.
Correction of typographical errors is not explicitly mentioned.