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INSTRUMENTS

Pride in Precision

## Forward and Reverse Mode

There are two different operating modes in TCSPC measurements performed on Edinburgh Instruments systems: Forward and Reverse.

In Forward Mode the pulse rate from the light source is linked to the START input. This rate (with generally equally spaced pulses in time) is substantially higher than the more or less random pulses from the detector linked to the STOP input (Fig.1).

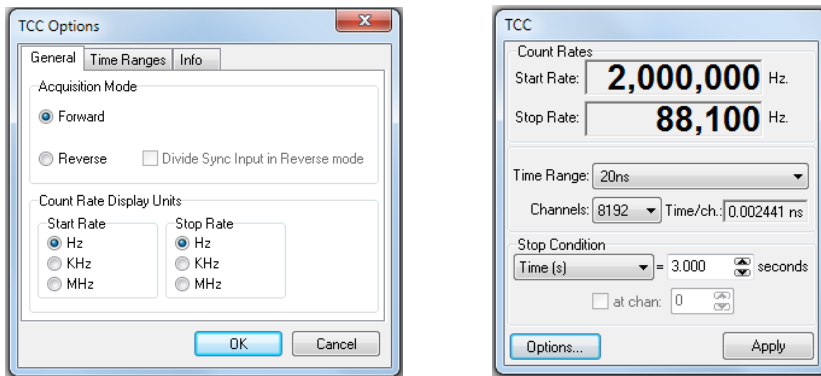


Fig.1 TCSPC measurements setup dialogs for forward mode

At high rates of the light source the forward mode has a clear disadvantage. Because the vast majority of Time-to-Analog Converter cycles will be started by the START pulse, but never stopped by a STOP signal, it needs to be reset at overflow. The electronics is kept busy more than 20 times the amount actually needed. Therefore Forward mode is recommended relatively low frequencies of the source i.e. lower than or equal to 1 MHz.

In order to decrease the operating charge of the electronics and to utilize the full capability of signal processing the counting system can be operated in the Reverse Mode.

In this mode, the signal cable carrying the high-count rate from the light source is linked to the STOP Rate and the low rate is linked to START (Fig.2). In reverse mode, the time axis of the memory histogram is internally reversed and the decay is plotted in the same way as for forward mode. Reverse mode is recommended when the source operates at repetition rate from 1 MHz to 100 MHz. This equates to a minimum dead time, in reverse mode, of 10 ns.



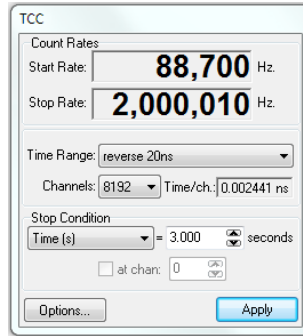
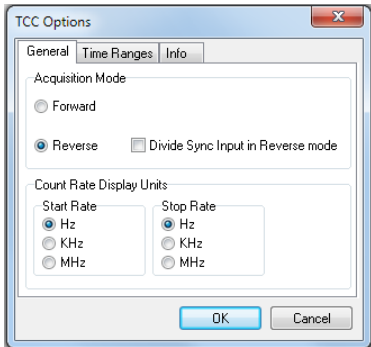


Fig.2 TCSPC measurements setup dialogs for reverse mode

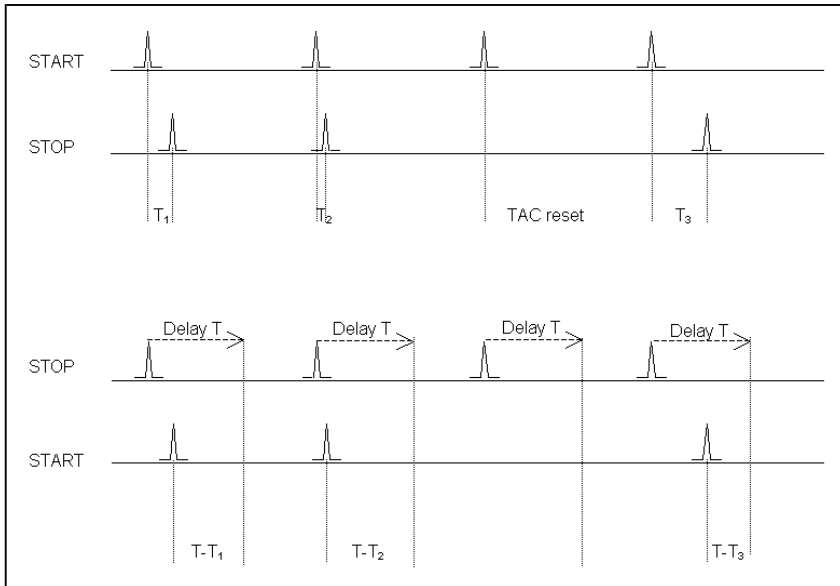


Fig.3 Forward mode (top) and Reverse mode (bottom) pulses