

PSD@CBM firmware description (draft, for internal use)

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Actual version of the document is available at github:

https://github.com/dfinogee/PSD-readout-manual/raw/main/PSD_readout_manual.pdf

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1 ADC data processing

1.1 Channel data collecting

Each channel collect data in FIFO (chdata_fifo) in hit packet format and emit ready signal after data stored in fifo. Ready signal is synchronous to signal threshold crossing and used for event ADC timestamp fig. 2. Implemented in PSD_channel_calc.

Mean hit rate per channel = $\text{SYSCKL} / \text{total channels} / \text{packet length}$. $\text{SYSCKL} = n * \text{ADCclk} = 240\text{MHz}$; total channels = 32; packet length = 1. Max mean hit rate is 7.5 MHz.

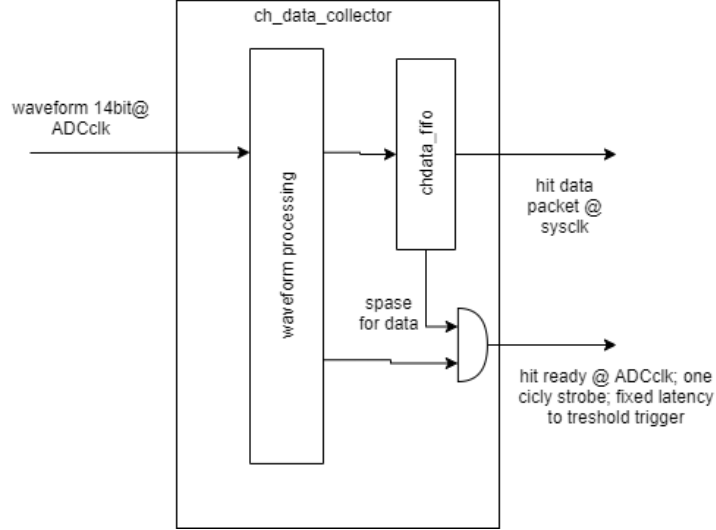


Figure 1: Data collecting scheme for single channel

word	79 .. 72	71 .. 64	63 .. 34	33 .. 16	15 .. 0
1	waveform points number	channel	0x0	signal charge	waveform zero level

Table 1: hit packet header.

word	79 .. 64	63 .. 48	47 .. 32	31 .. 16	15 .. 0
1	0x0	waveform point n	waveform point n+1	waveform point n+2	waveform point n+3

Table 2: hit packet data word.

todo: wf points num to data words num

todo: fit procedure implementing in waveform processing

1.2 Data collecting from channels fifo

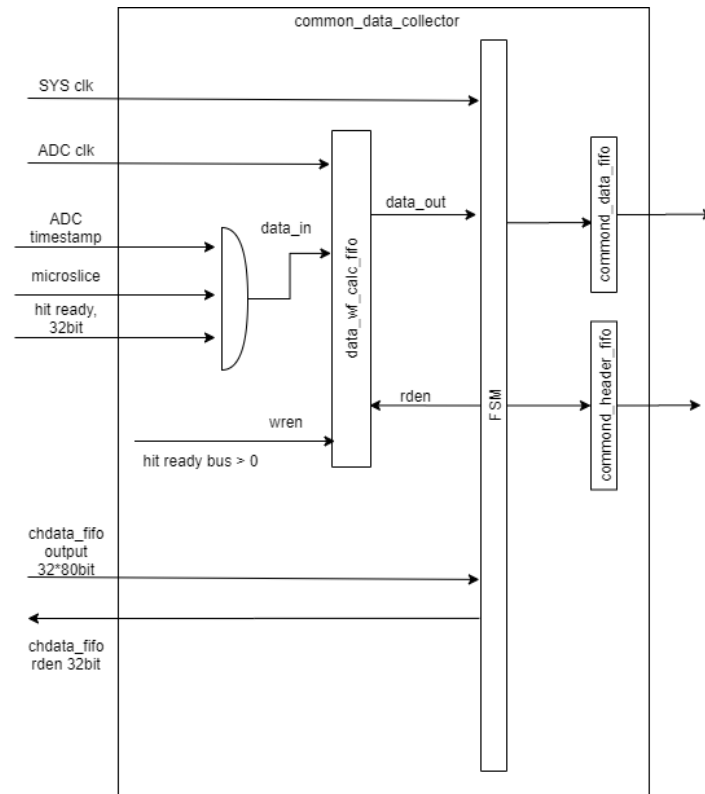


Figure 2: Data collecting scheme from all channels fifos