Time difference measurement by DPP

Feature

Our **digital pulse processors (DPP)**, such as APV8108 and APV8516, can acquire waveforms with a high-speed, high-resolution ADC, so they are extremely excellent for time pickoff by waveform analysis.

Our digital signal processing algorithm performs high-speed fitting by FPGA and calculates more precise time information. Furthermore, by performing calculations in the **pipeline format**, the series of operation times is calculated at a very high speed of about 100 ns or less, so dead time is small and high throughput is realized.
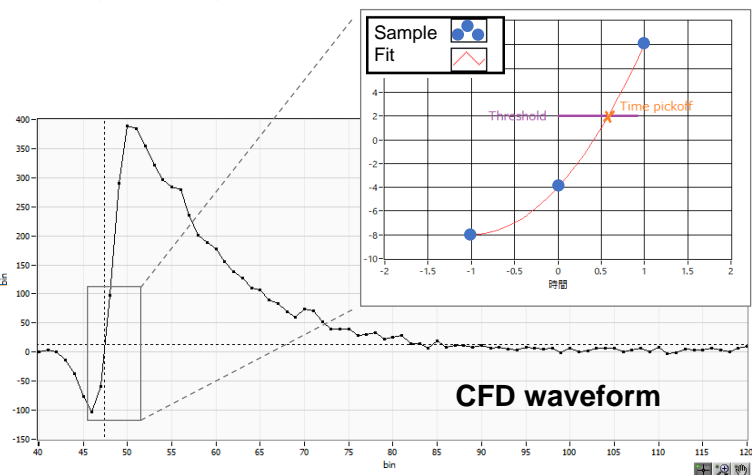

Figure 1.
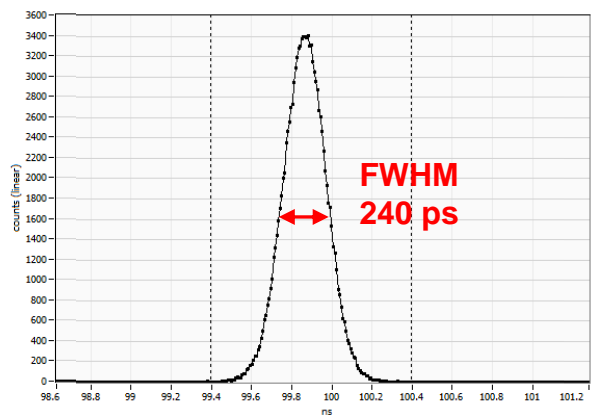**Time pickoff by curve approximation**

Figure 2.
Time spectrum of **LaBr$_3$(Ce) vs LaBr$_3$(Ce)**

Comparison with other formats

The differences with other methods are shown below. It covers the advantages of analog TAC and digital TDC and can be replaced for the purpose of data processing and performance improvement.

TAC	◎	High time resolution and differential nonlinearity
	×	Multiple channels with small channels → Large space, large power consumption
	△	Counting rate
TDC	△	Time resolution
	×	Differential nonlinearity
	◎	Multi-channel
	◎	Cost
DPP	◎	**Time resolution and differential nonlinearity**
	○	**Multiple channels**
	◎	**Counting Rate**
	○	**Cost**

Table 1. Comparison of TAC, TDC, and DPP performance