Known Pattern with Bit Clock &Marker

For the SIA

Introduction

This paper describes the setup and results of the Known Pattern with Bit Clock and Marker measurement tool. The first section focuses on the setup while the second section addresses the making of measurements and understanding the results.

Tool Setup

This tool can operate either with the Clock Recovery option installed or with an external bit clock applied to another input. A pattern marker is necessary and can possibly be derived from the data pattern generator. But, in many cases, this signal is not externally available and it is useful to have the SIA Pattern Marker (PM50) option or the SIA-4000 integrated Pattern Marker. The pattern requirements are such that a repeating pattern is needed.

If a Clock Recovery option is installed, connect the SIA as shown in Figure 1. The Data pattern is connected to the input of the Clock Recovery input. The Clock Recovery Data output is looped back to IN1 with the PM50 option.

Figure 1

If you do not have the Clock Recovery option installed, refer to Figure 2.

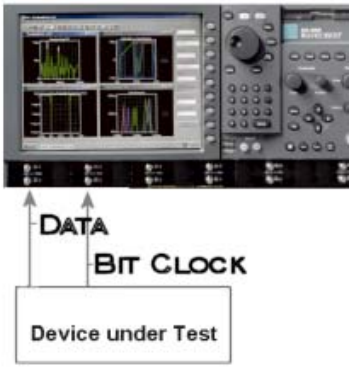


Figure 2

From the Main Dialog Bar, click on Data and Known Pattern with Bit Clock and Marker to open the tool.

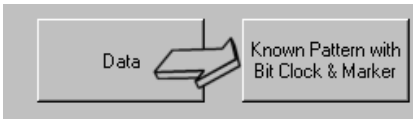


Figure 3

Figure 4

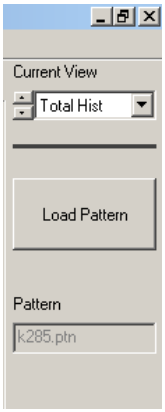


Figure 6

From the dialog bar, you can choose if you would like to identify periodic jitter frequencies in an FFT plot. (See figure 4) If you enable this feature, you have the choice of setting a –3Db HPF frequency or the tool will calculate the HPF filter setting by dividing the bit rate by 1667. The value will be displayed in the corner frequency window.

Assigning channels is accessed from the Acquire Options menu (See Figure 4). The Reference Channel (See Figure 5) corresponds to the bit clock signal. This can either be applied from the clock recovery option or from an external bit clock. The Data Channel corresponds to the input of the repeating data signal. The Arm Number will enable the PM-50 (if installed) or a pattern sync signal from a data pattern generator. The arm delay can be adjusted between 19-21 nanoseconds for the arm signal placement. The Error Tolerance window will allow you to set a parameter for the Edge measurements. Any measurement of an edge that exceeds this value will cause an error. The Stop on Success window defines the TailFit™ operation for quality requirements that must be met in order to successfully separate RJ and DJ. If there is a large DJ component, several passes may be required. You can enable this option and then run/cycle in order to accumulate until the requirements have been met. The Min. Hits window defines that a Tailfit will not be attempted until the number of hits specified is acquired.

To select a data pattern in the SIA, at the dialog bar (Figure 4), click on the pattern options button. This will take you to the pattern dialog bar (See Figure 6). From here, select load pattern. Once you have selected a data pattern (Figure 7), the pattern name will appear in the Pattern field. See Figure 6.

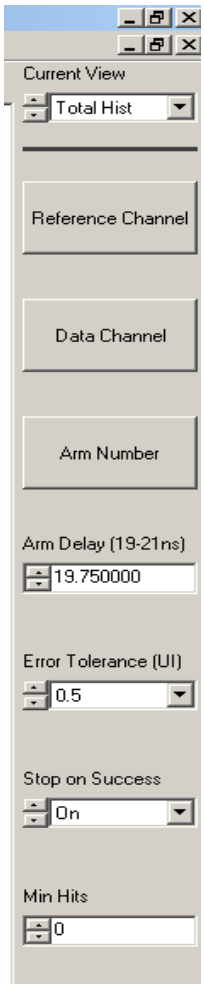


Figure 5

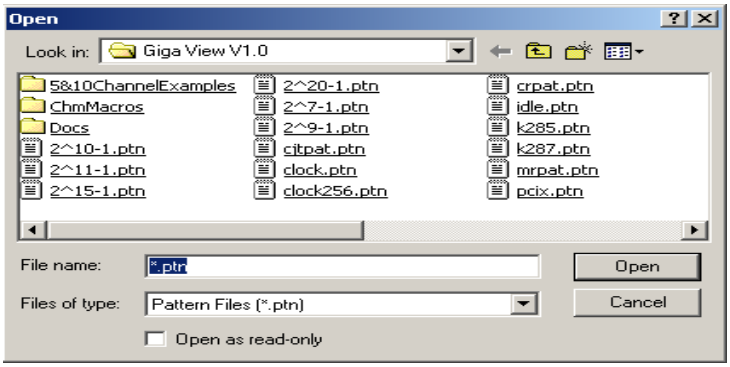


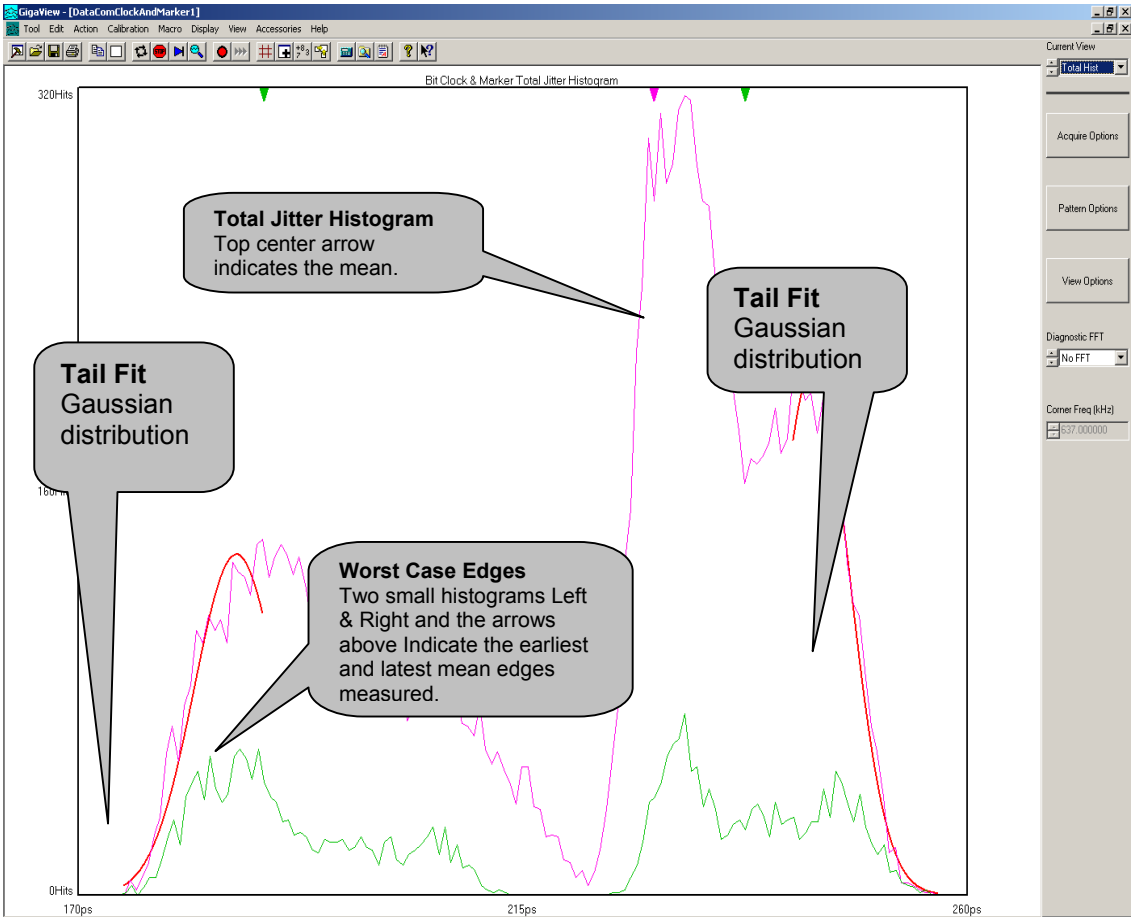
Figure 7

Making the Measurement and Understanding Results

To perform a measurement, press the Run () button. Several views are available once the measurement is complete. All views can be displayed by changing the "Current View".

Total Jitter Histogram View

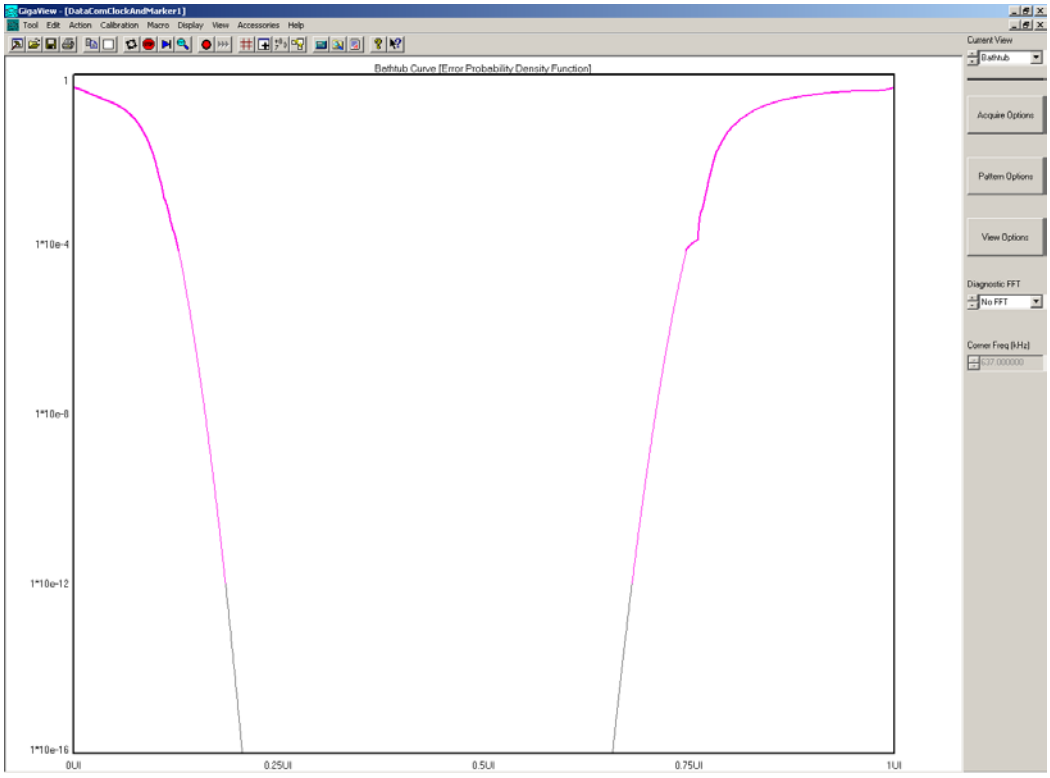
The Total Jitter Histogram view shows the Clock to Data measurements. An arrow at the center on the top of the plot indicates the mean of the Total Jitter Histogram. Two other histograms to the left and right are the histograms of edge measurements from the earliest and latest measured mean edge times. Different colored arrows at the top left and right indicate the means for each of those.



The Tail Fit algorithm is automatically run in this tool. The DJ reported value is determined by which ever is larger, the mean value of the worst-case histogram or the mean of the Tail Fit in the data pattern.

Bathtub Curve View

The Bathtub curve shows the predicted Total jitter at a specific Bit Error Rate. Bit Error Rate is displayed on the vertical axis and one UI is displayed on the horizontal. As jitter increases, the two lines will move closer to each other.

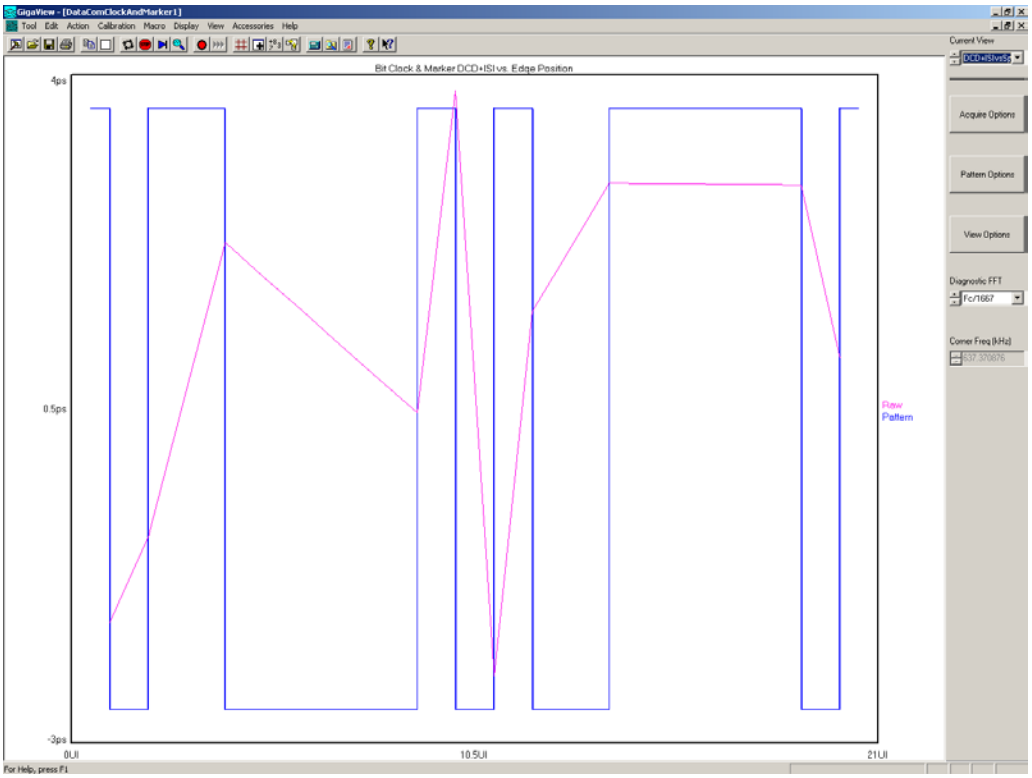


DCD+ISI vs Span View

This view plots the DCD+ISI relative to the pattern. It gives information about how the DCD+ISI component of jitter varies relative to bit position of the pattern. The information in the UI Distrib view is over laid on the DCD+ISI information to show where in the pattern it occurred. This plot shows jitter components that are correlated to the data and relates to the DCD+ISI number in the Summary view. A zoomed in view of this plot will show three lines at each edge position. They give an indication of the average location of each edge and the pk-pk size of all measurements taken of each edge.

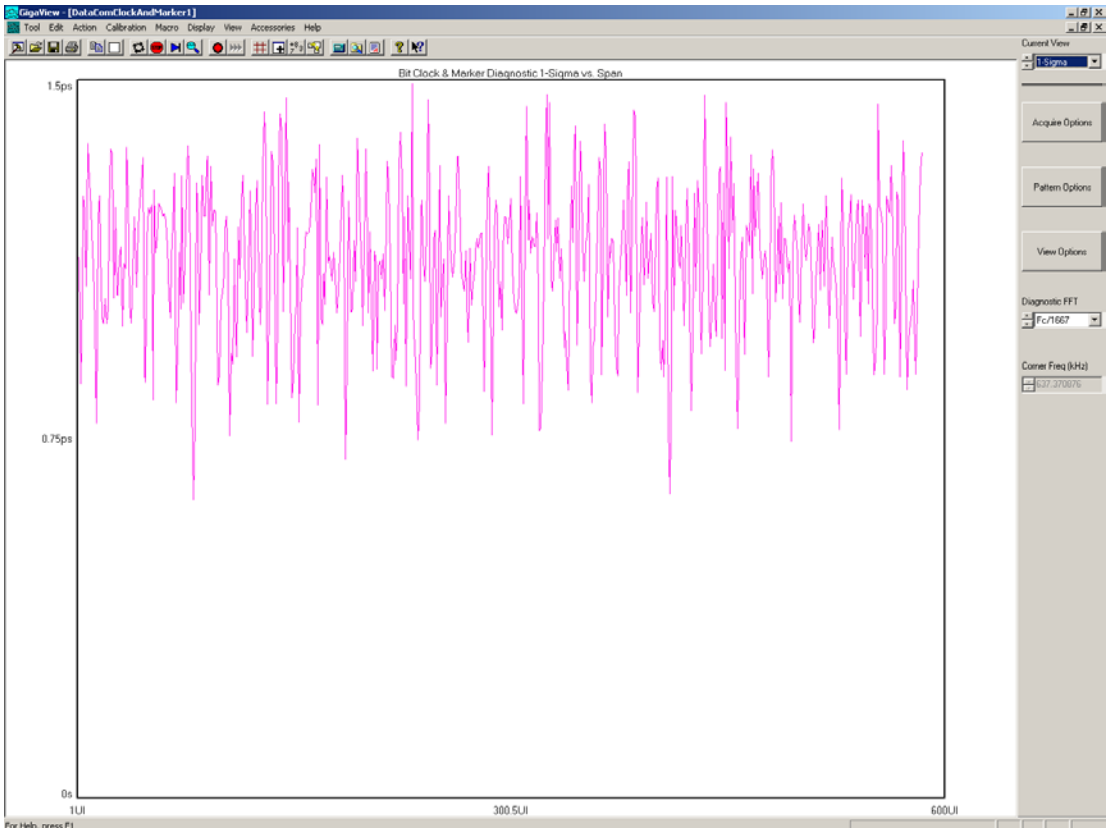
The x-axis shows average edge position relative to the pattern marker.

The y-axis shows time, which is the average edge deviation from its ideal location measured from the bit clock.



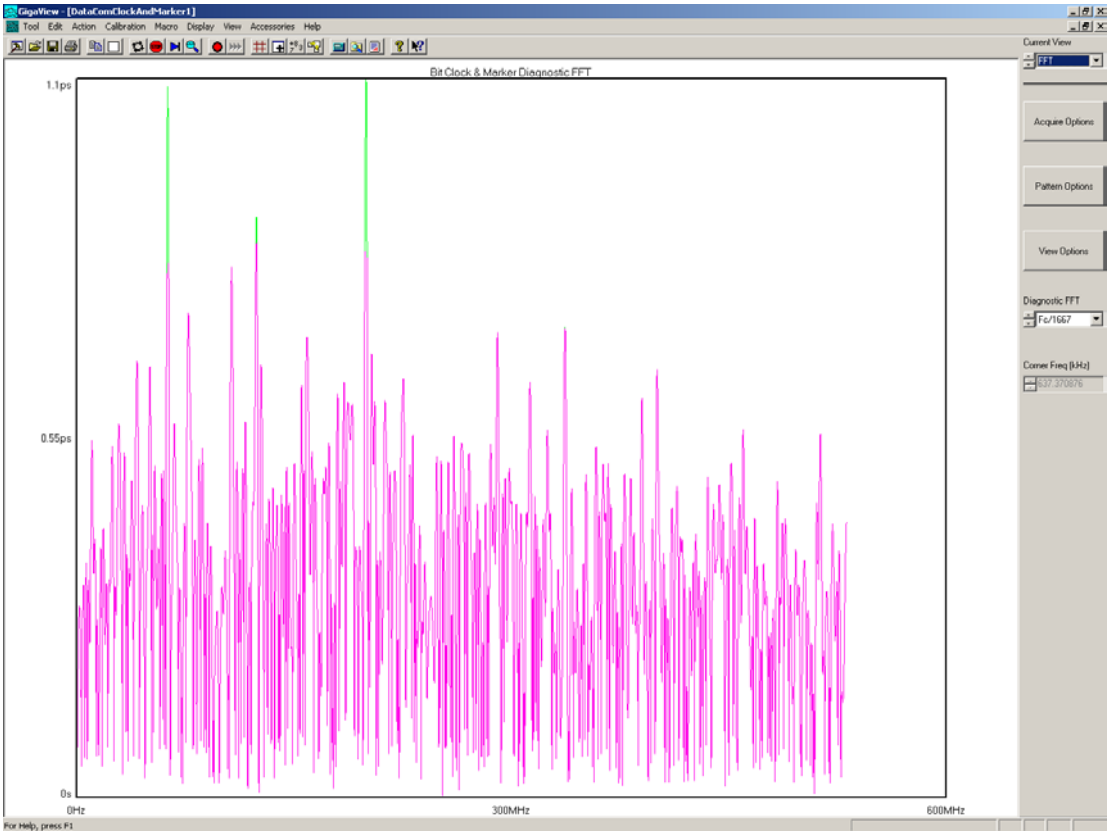
1 – Sigma View

This view allows the user to see jitter modulation. It shows the 1-sigma values for many histograms. This plot shows jitter components that are NOT correlated to the data and relates to the PJ numbers in the Summary view. Refer to explanation of High Frequency Modulation quick reference guide for more information on the measurement technique used to generate this plot. The 1-sigma values are plotted to give the user a view of the modulation that may be causing PJ. The x-axis shows spans of accumulated edges and the y-axis shows 1-sigma. This plot will only be available if you have chosen to run a diagnostic FFT from the main screen. See Figure 4.



FFT View

This is the FFT of the Autocorrelation of the variance from the 1-sigma view. This plot shows the spectral power density of the uncorrelated jitter frequencies from the corner frequency specified to the Nyquist of the bit rate. This plot shows jitter components that are NOT correlated to the data and relates to the PJ number in the Summary view. The x-axis shows frequency content of the PJ with higher frequency on the right and lower frequency on the left. The y-axis shows the amplitude or power density of the periodic components. This plot is only available if you have chosen to run a diagnostic FFT from the main screen. See Figure 4.



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