Measurements of DMD-Challenged Fibers at 1310nm and 1Gb/s Data Rate

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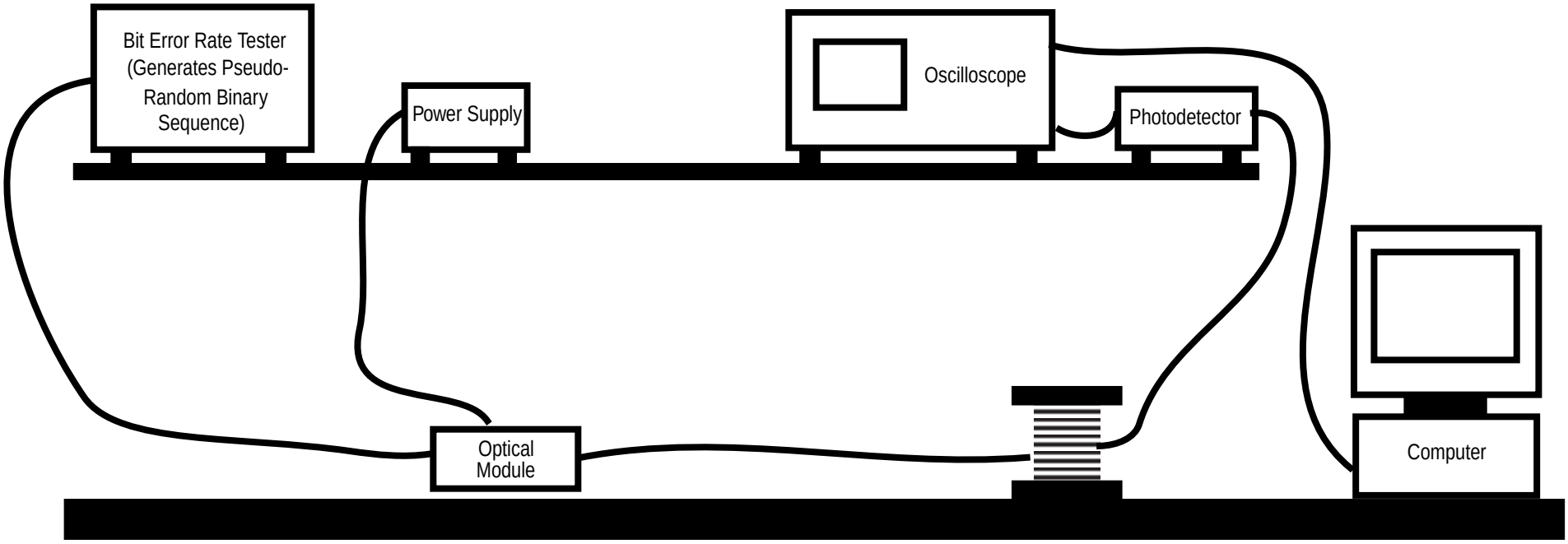
Overview

- **Measurement setup and methodology**
- **Table of measured fibers**
- **Theoretical analysis of measurements**
- **Experimental results at 1310nm (1Gb/s data rate)**
- **Future work**

Measurement Setup



Measurement Setup *(cntd)*

- **Bit Error Rate Tester (BERT) generates a 127-bit pseudo-random binary sequence (PRBS) at 1Gb/s data rate**
- **Laser is a 1310nm DFB in a connectorized module**
- **Photodetector is a commercial 10GHz optical receiver**
- **High-bandwidth (1.5GHz), high sampling rate (8GHz) oscilloscope (Agilent Infinium), captures blocks of 65K samples**
- **Randomly selected fibers per table of next viewgraph**
- **Measurements where the fiber was shaken were taken (also taken were measurements where the fiber was *not* shaken, however the results do not differ from the shaken case, and therefore they will not be reported here)**

Measured Fibers

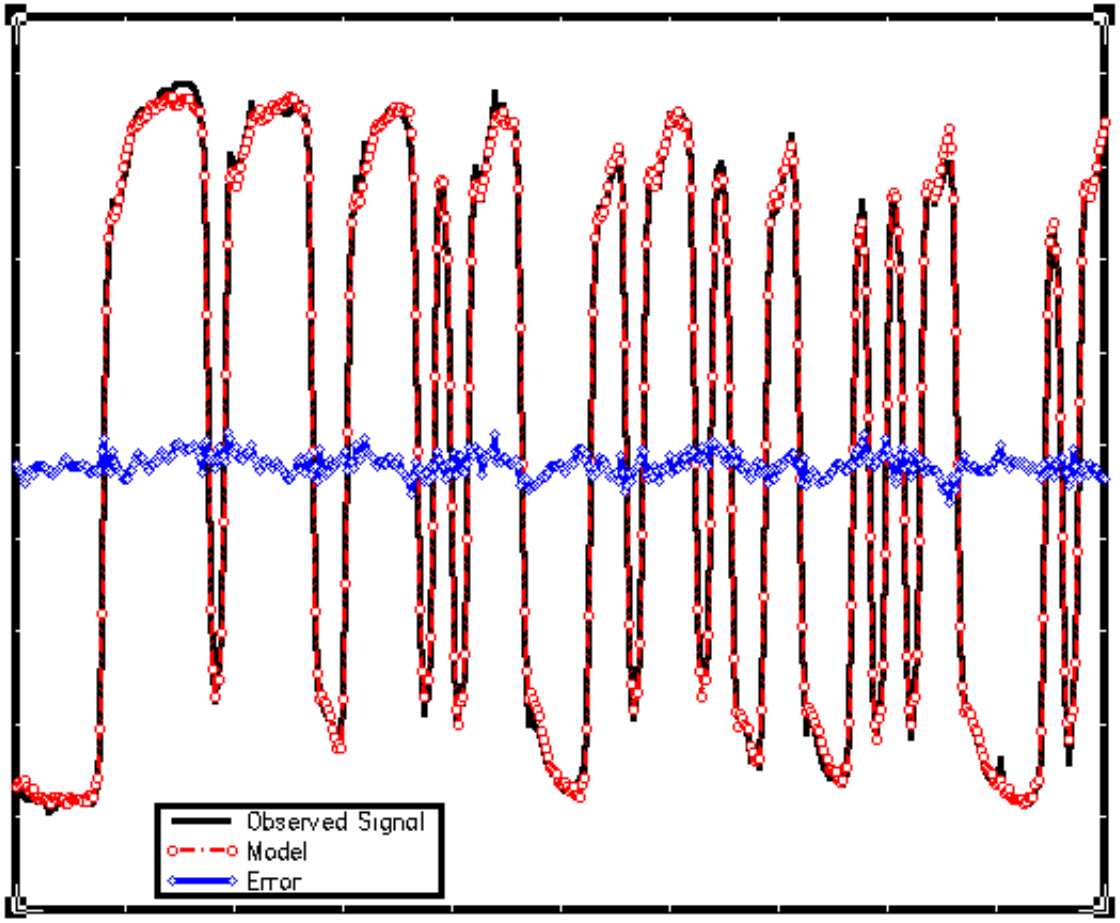
FIBER	CORE DIAMETER[μm]	LENGTH[m]	MANUFACTURER
F0	62.5	270	Fujikura
F1	50.0	1152	Corning
F2	62.5	2234	Corning
F3	50.0	2247	Corning
F4	62.5	1151	Corning
F5	50.0	540	Corning

Processing of Measured Data

- **The measured data was processed as per the document *"Measurement of Non-Stationarity of 10Gb/s Multimode Fiber Links"*, by O.Agazzi and T.Lenosky, available from:**

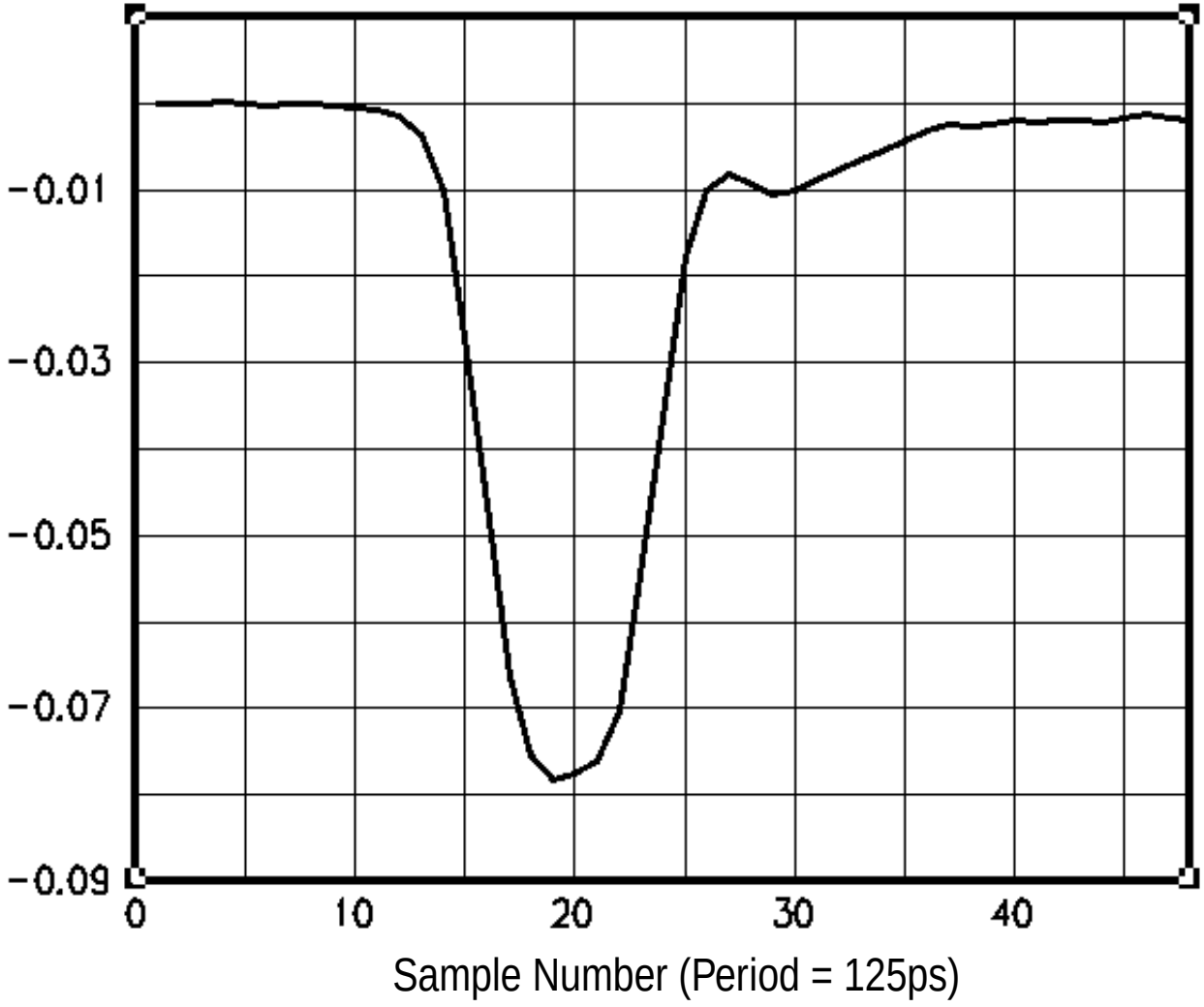
  http://www.ieee802.org/3/ae/public/adhoc/equal/NonStationarity112200.pdf

Measured Signal vs. Model and Error (Fiber F0)

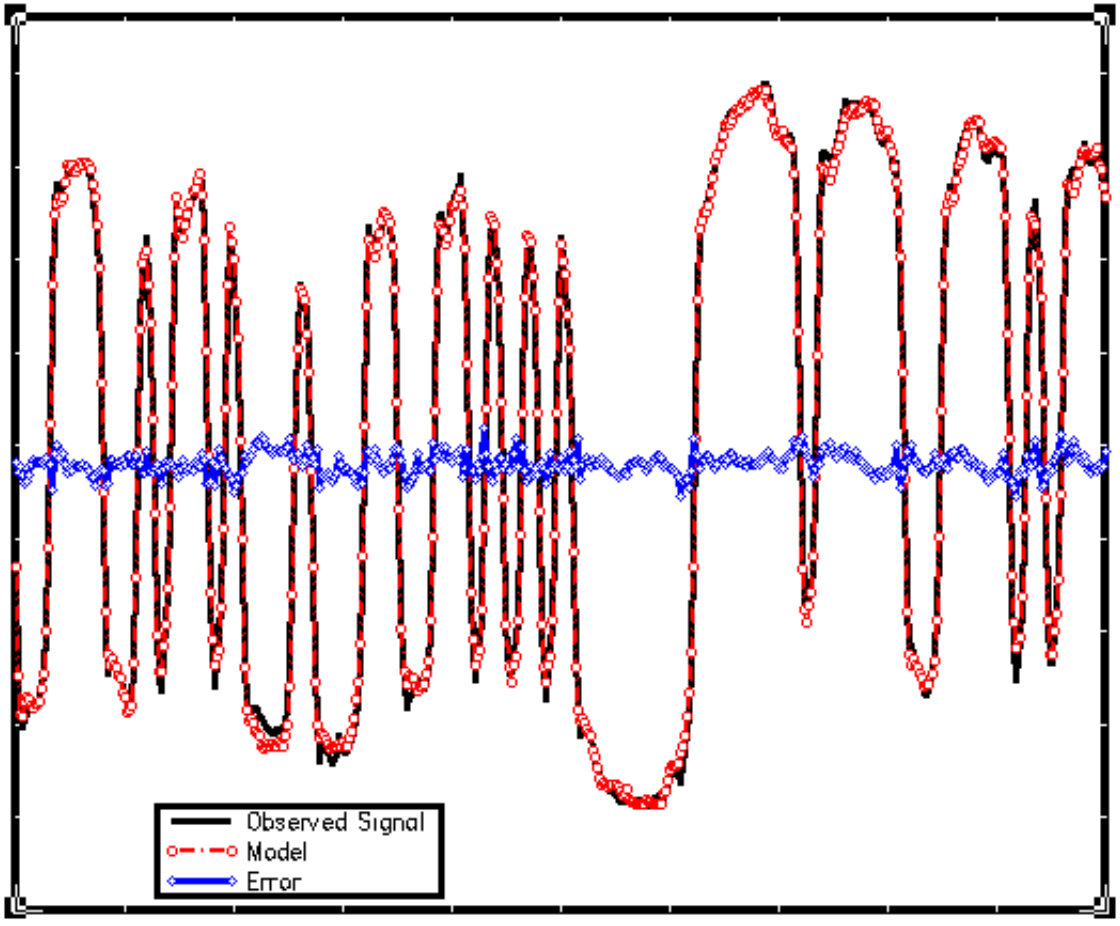


(NOTE: Bit Rate = 1Gb/s, Sampling Rate = 8GHz)

Impulse Response (Fiber F0)

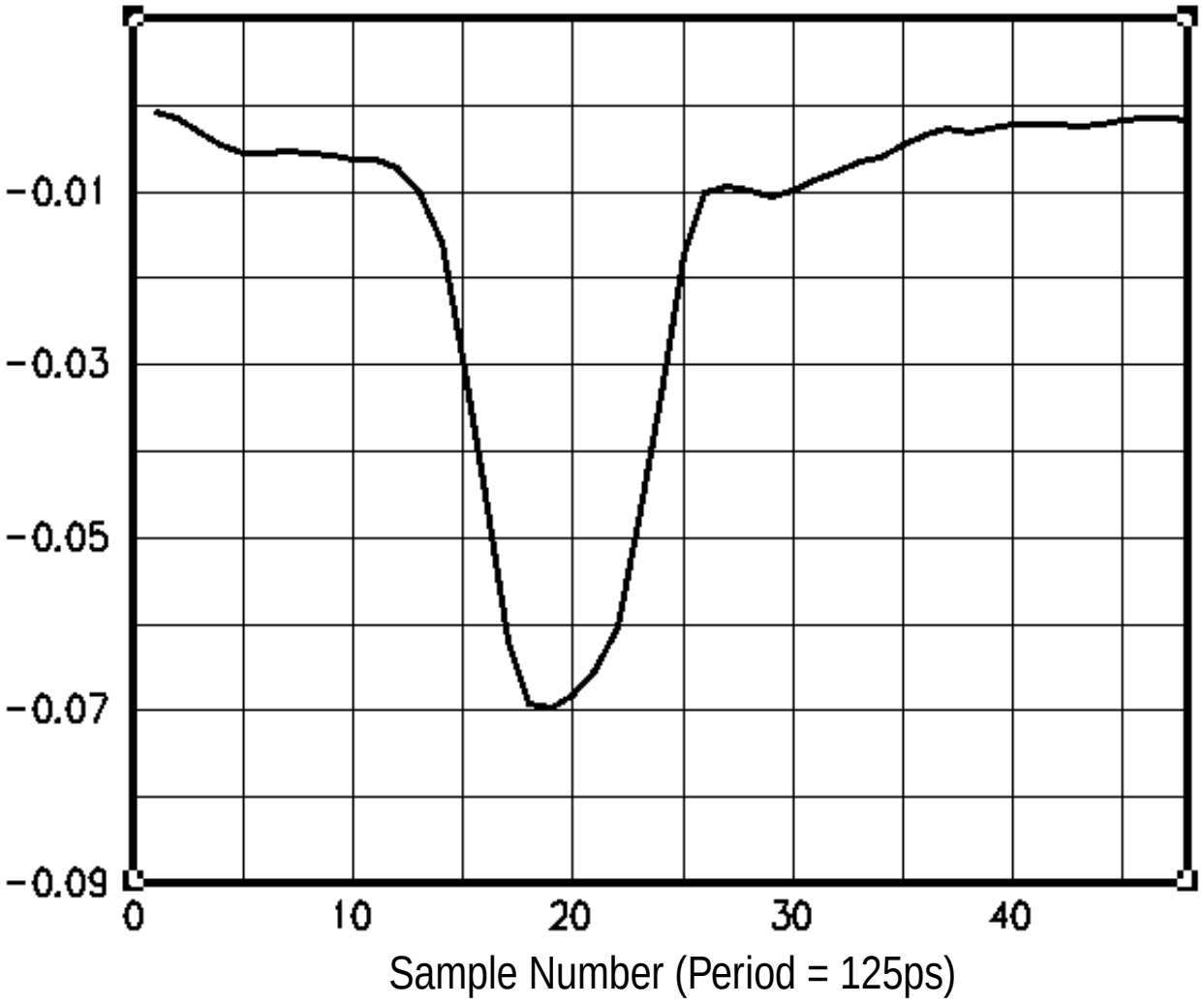


Measured Signal vs. Model and Error (Fiber F1)

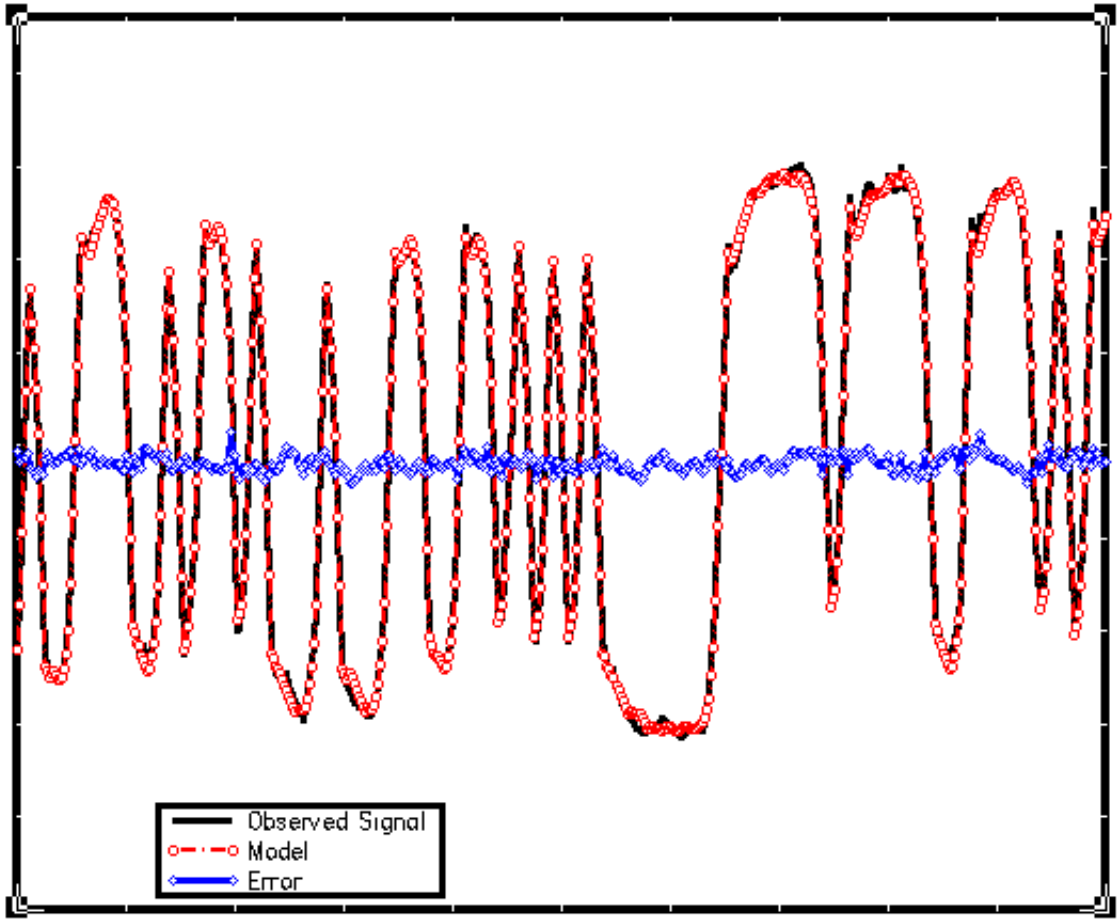


(NOTE: Bit Rate = 1Gb/s, Sampling Rate = 8GHz)

Impulse Response (Fiber F1)

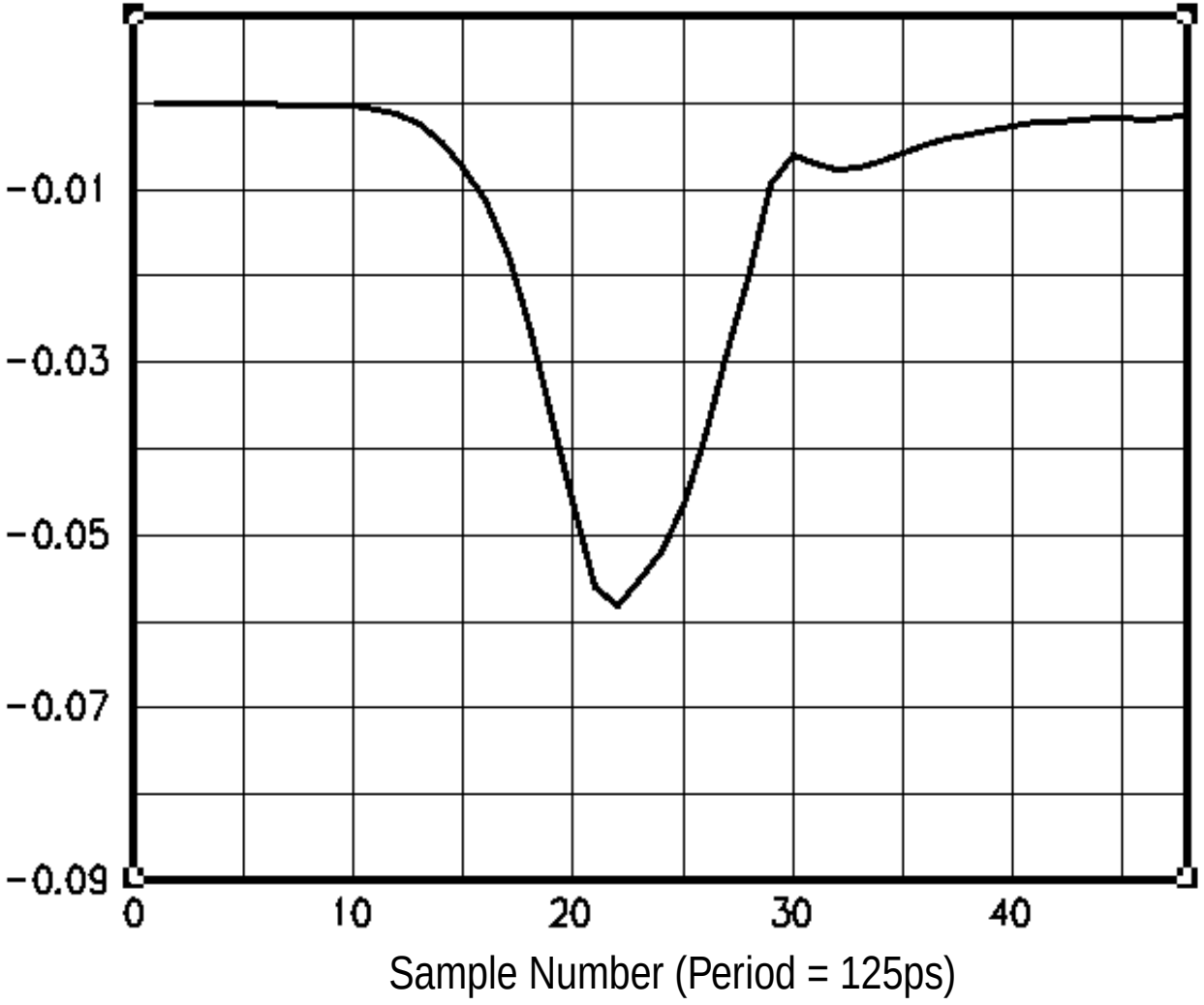


Measured Signal vs. Model and Error (Fiber F2)

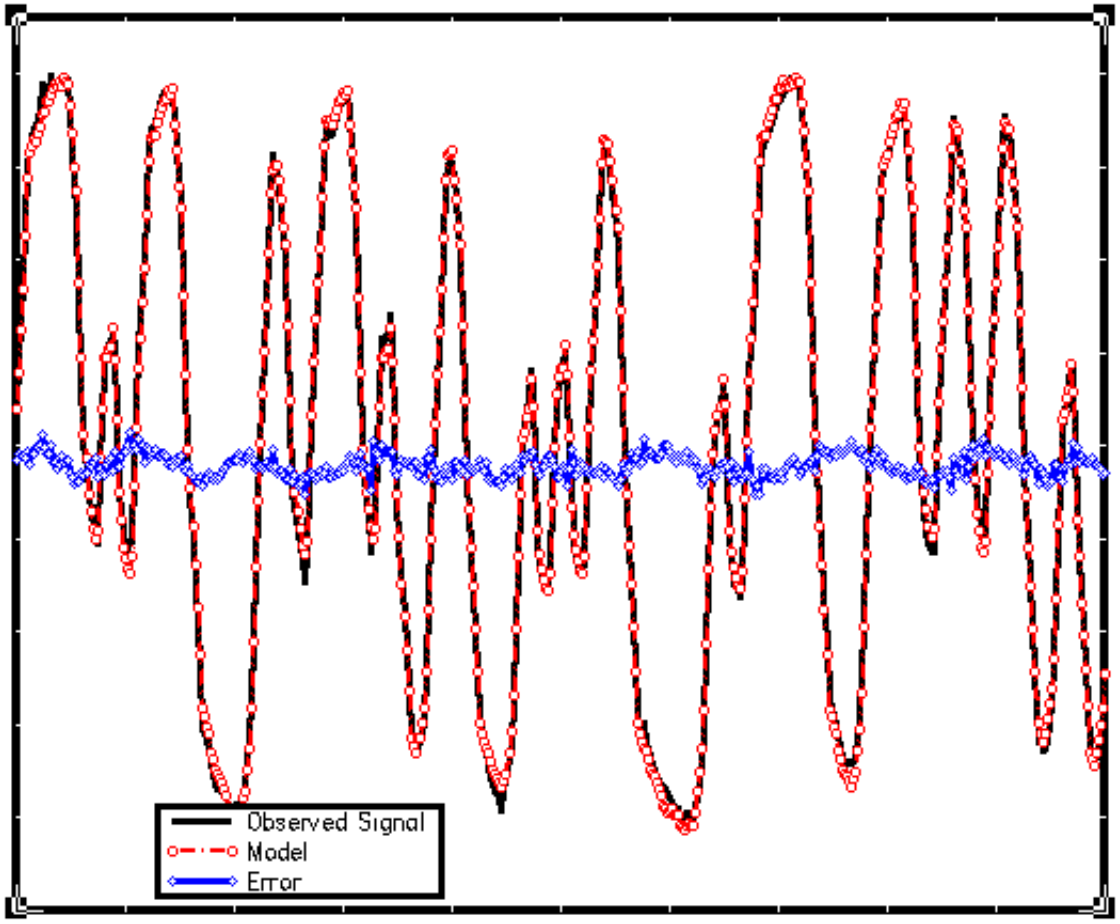


(NOTE: Bit Rate = 1Gb/s, Sampling Rate = 8GHz)

Impulse Response (Fiber F2)

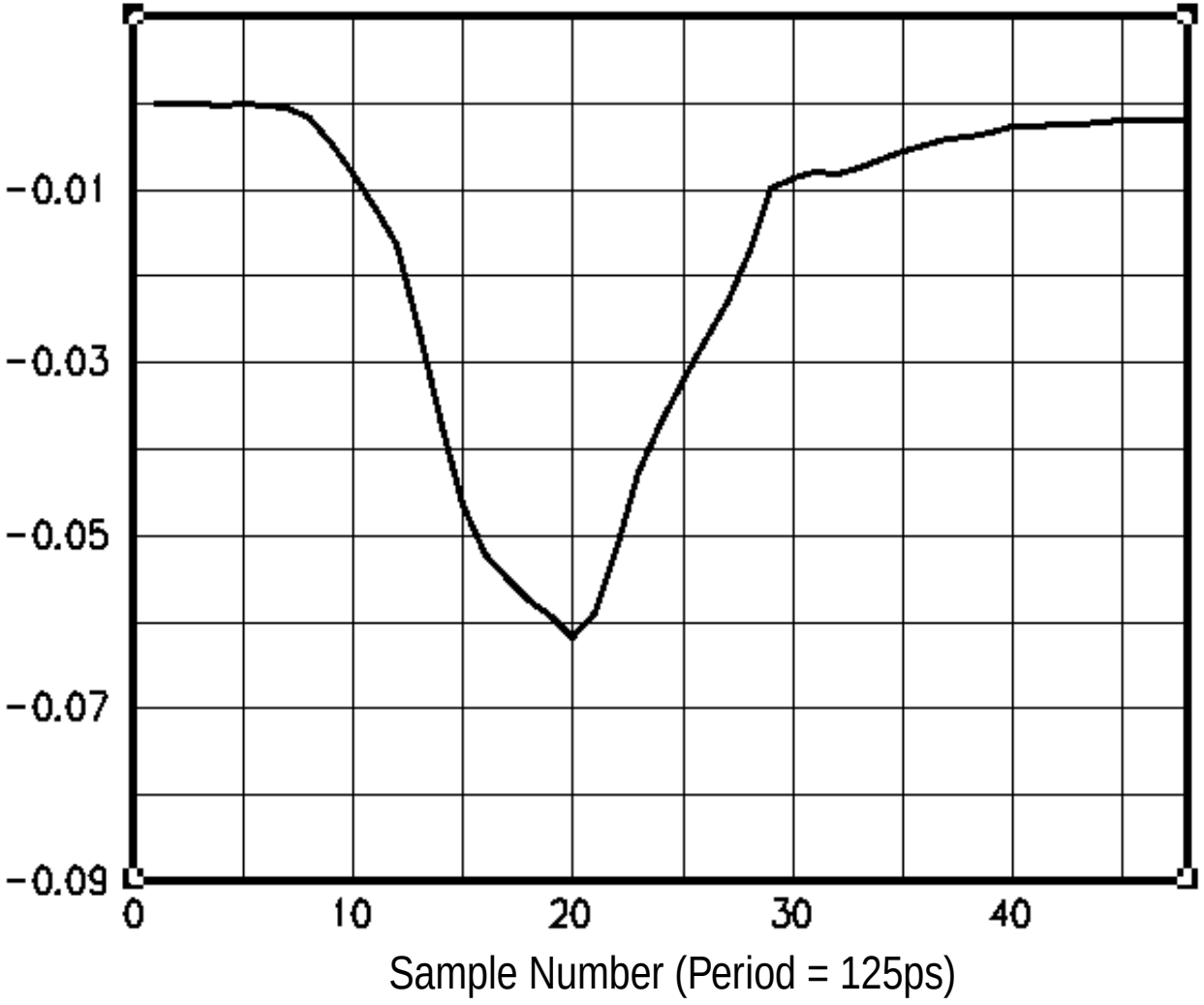


Measured Signal vs. Model and Error (Fiber F3)

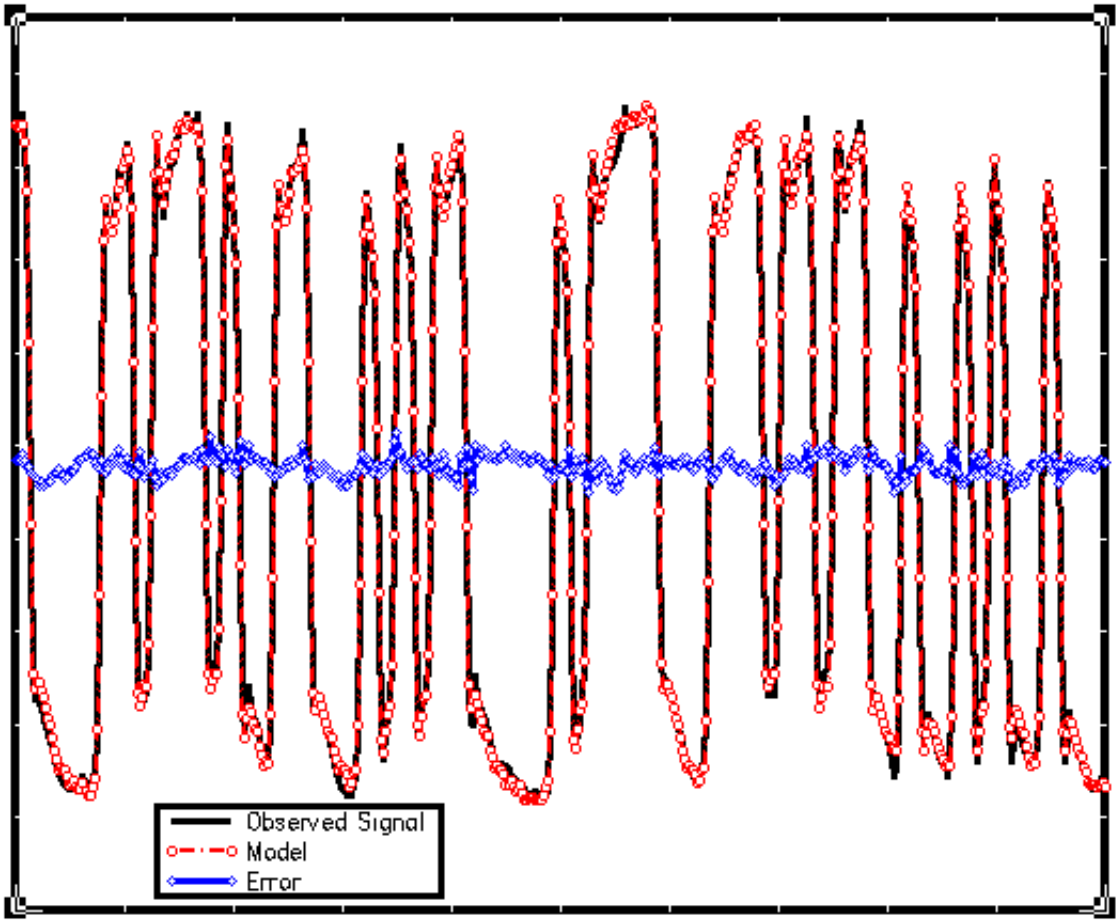


(NOTE: Bit Rate = 1Gb/s, Sampling Rate = 8GHz)

Impulse Response (Fiber F3)

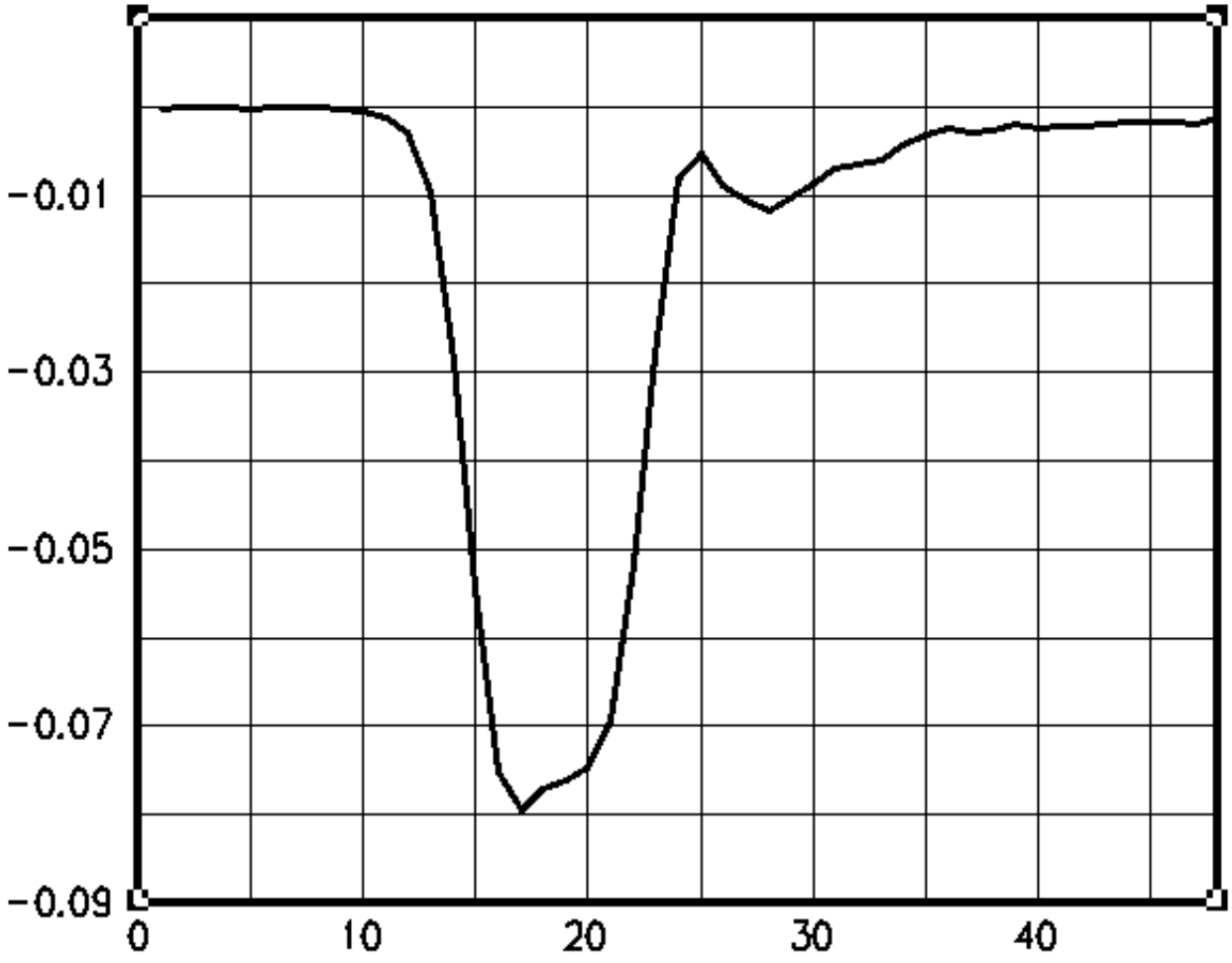


Measured Signal vs. Model and Error (Fiber F4)

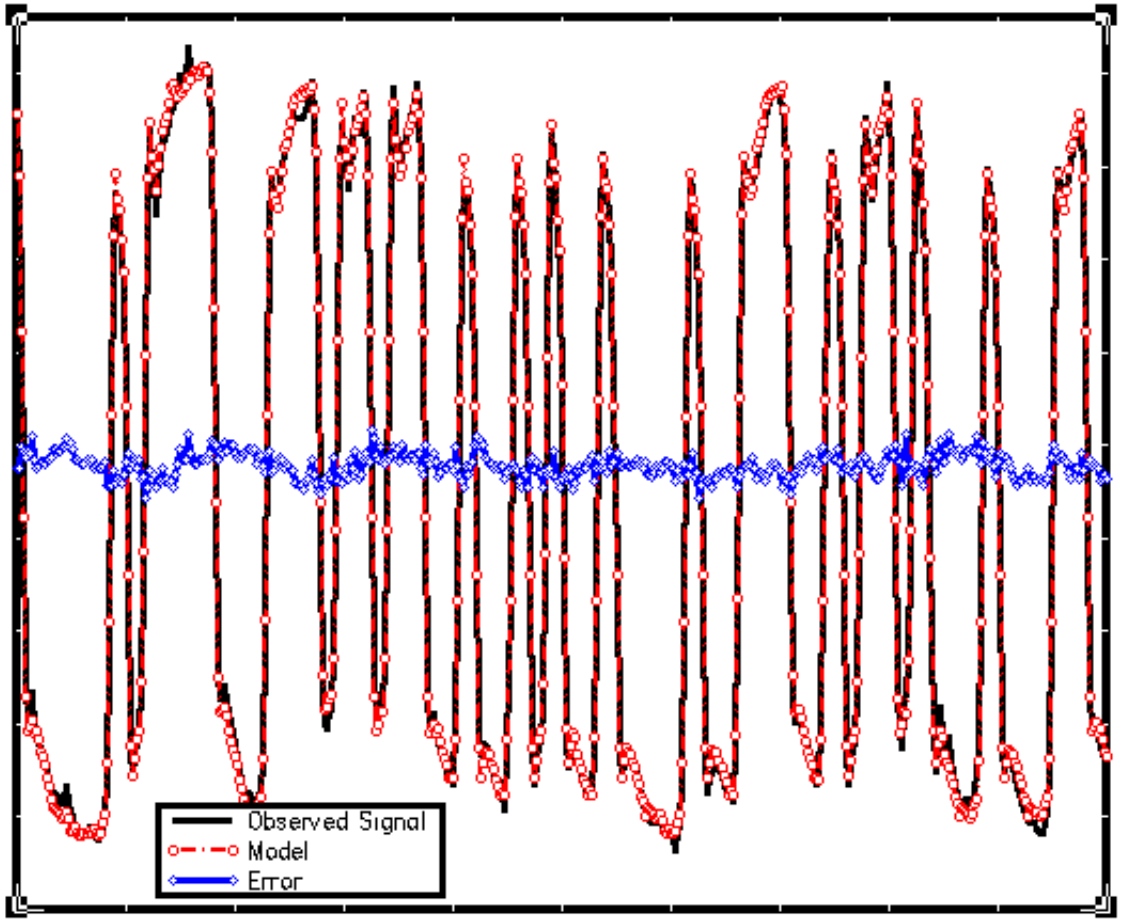


(NOTE: Bit Rate = 1Gb/s, Sampling Rate = 8GHz)

Impulse Response (Fiber F4)

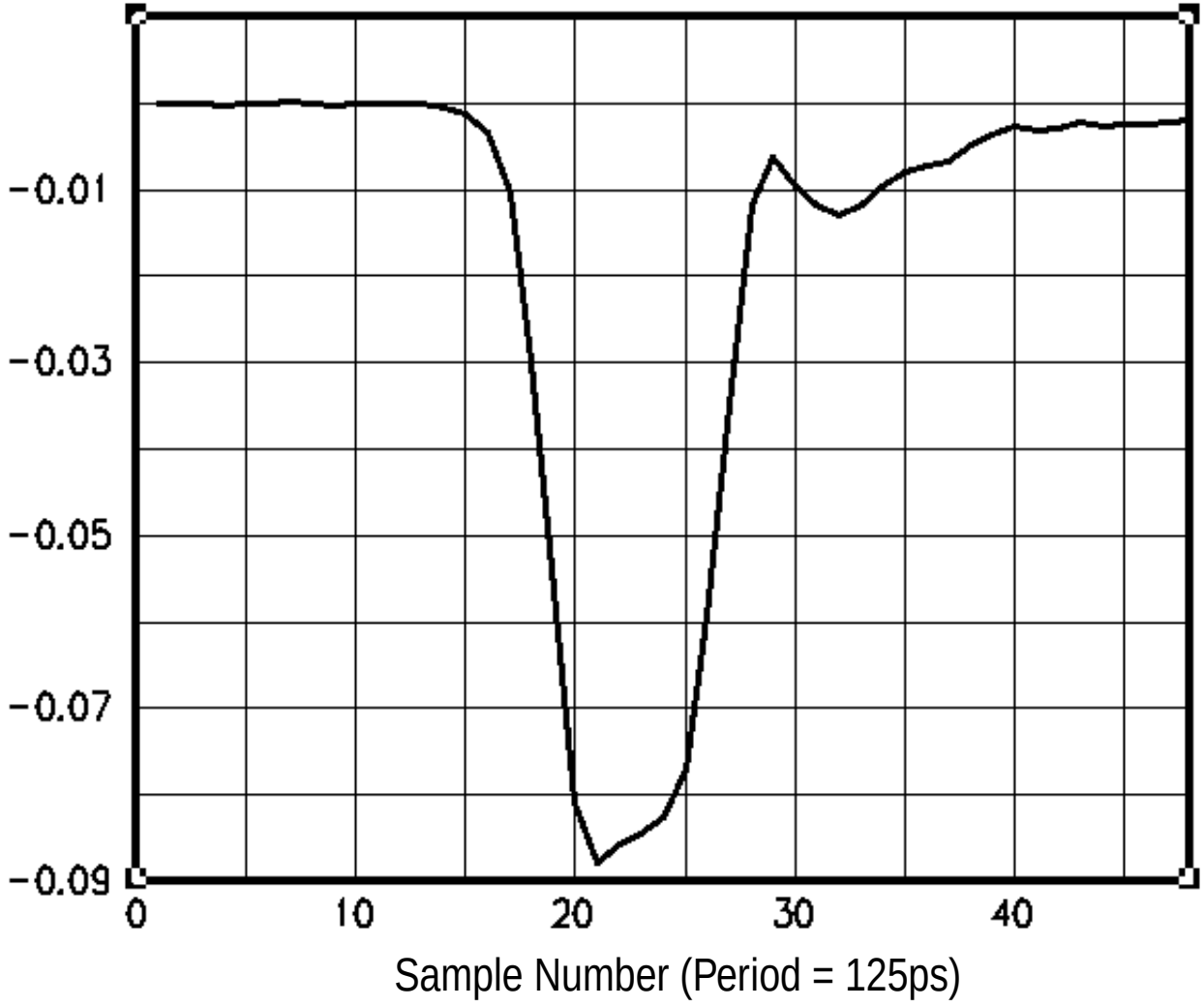


Measured Signal vs. Model and Error (Fiber F5)



(NOTE: Bit Rate = 1Gb/s, Sampling Rate = 8GHz)

Impulse Response (Fiber F5)



Signal to Noise Ratios

FIBER	SNR[dB]
F0	28.2
F1	26.6
F2	26.7
F3	27.4
F4	28.7
F5	28.2

NOTE: SNR is defined as 10 $\log_{10}$(Signal Power/Error Power), and it does not necessarily coincide with the slicer SNR of a receiver

Conclusions From Measurements

- **No evidence of non-stationarity was found in the measurements taken so far, regardless of whether the fiber was shaken or not during the measurement**

Future Work

- **Measurements at higher data rates, up to 10Gb/s**
- **Collect a more complete database of DMD-challenged fibers**