8b/10b ISI Killer Pattern Presentation & Comparison With CJTPAT

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8b/10b ISI Killer Pattern

- Based on the sequence: F4 (D20.7) , EB (D11.7)

- Repeating this sequence starting with RD- will give:
0010110111,1101001000,0010110111,1101001000,…

- 5 contiguous 1's followed by a single 0 and 5 contiguous 0's followed by a single 1 occurs every 20 bits.

- The pattern is a valid XAUI coding sequence and can be created easily because of its repetitive nature.

- To ensure the right initial disparity we repeat F4,EB sequence for 32 times (64 chars) and then add another F4 to flip the disparity (total of 65 chars). Repeating this 65 chars sequence ensure killer pattern in 50% of the time.

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CJTPAT Payload Used For The Comparison

167 7E's

1   74

1   7E

1   AB

51 B5's

1 5E

1 4A

4 7E's

1 FE

Repeating this 228 chars sequence will ensure "real CJTPAT" in 50% of the time.
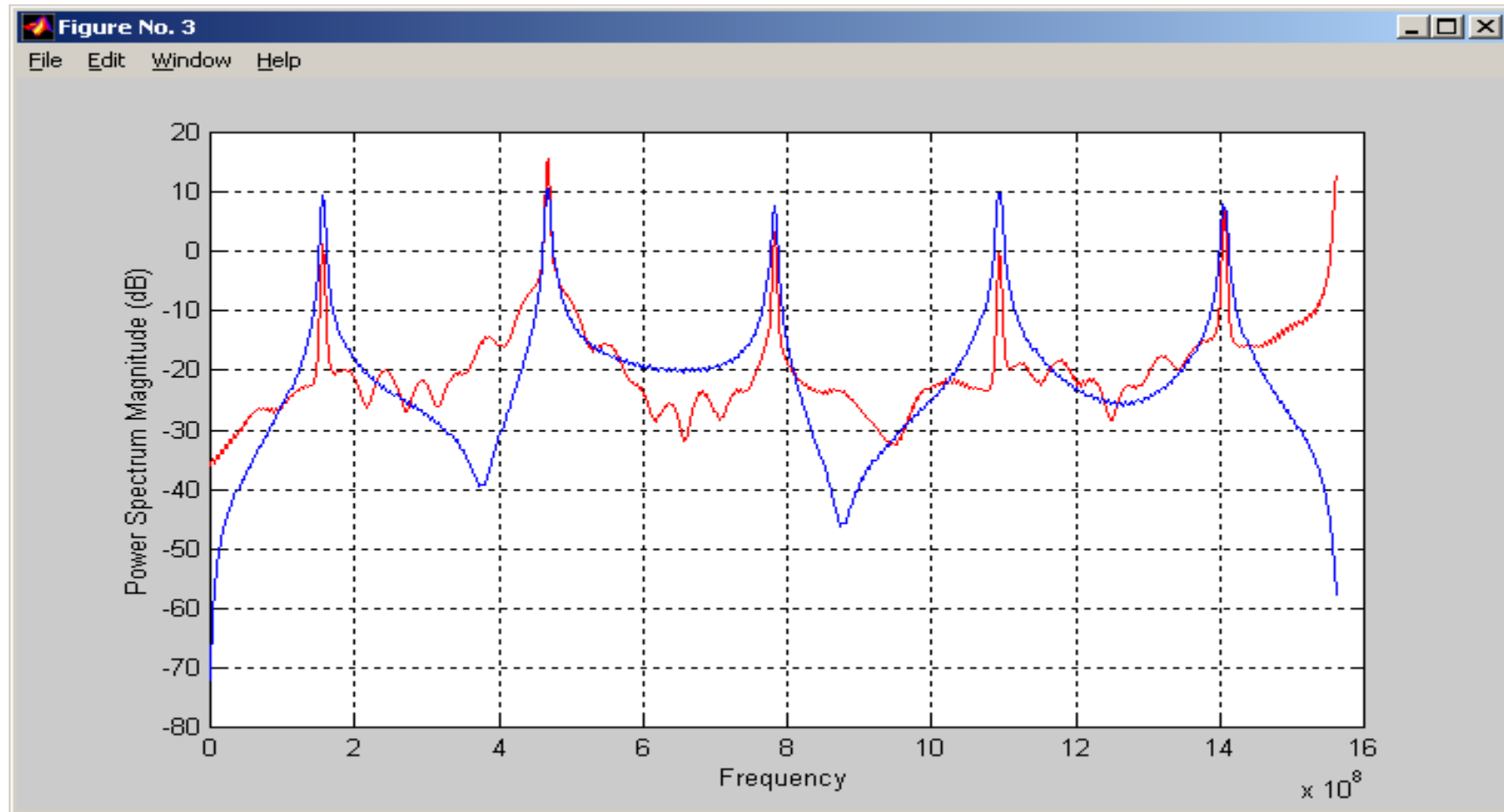
Comparison Simulation

• Matlab Simulation with the two data patterns were done separately on the same setup.

• Each simulation consists of more than 40000 transmitted bits sequence which creates about 20000 transitions.

• The bit sequence contains long data patterns (1500 to 1550 chars of the CJTPAT payload or the ISI killer pattern) separated with short random Idle sequence (less than 11 chars of IPG).

• For the CJTPAT payload sequence we had 44716 bits with 20553 transitions.

• For the ISI killer pattern sequence we had 41362 bits with 20596 transitions.
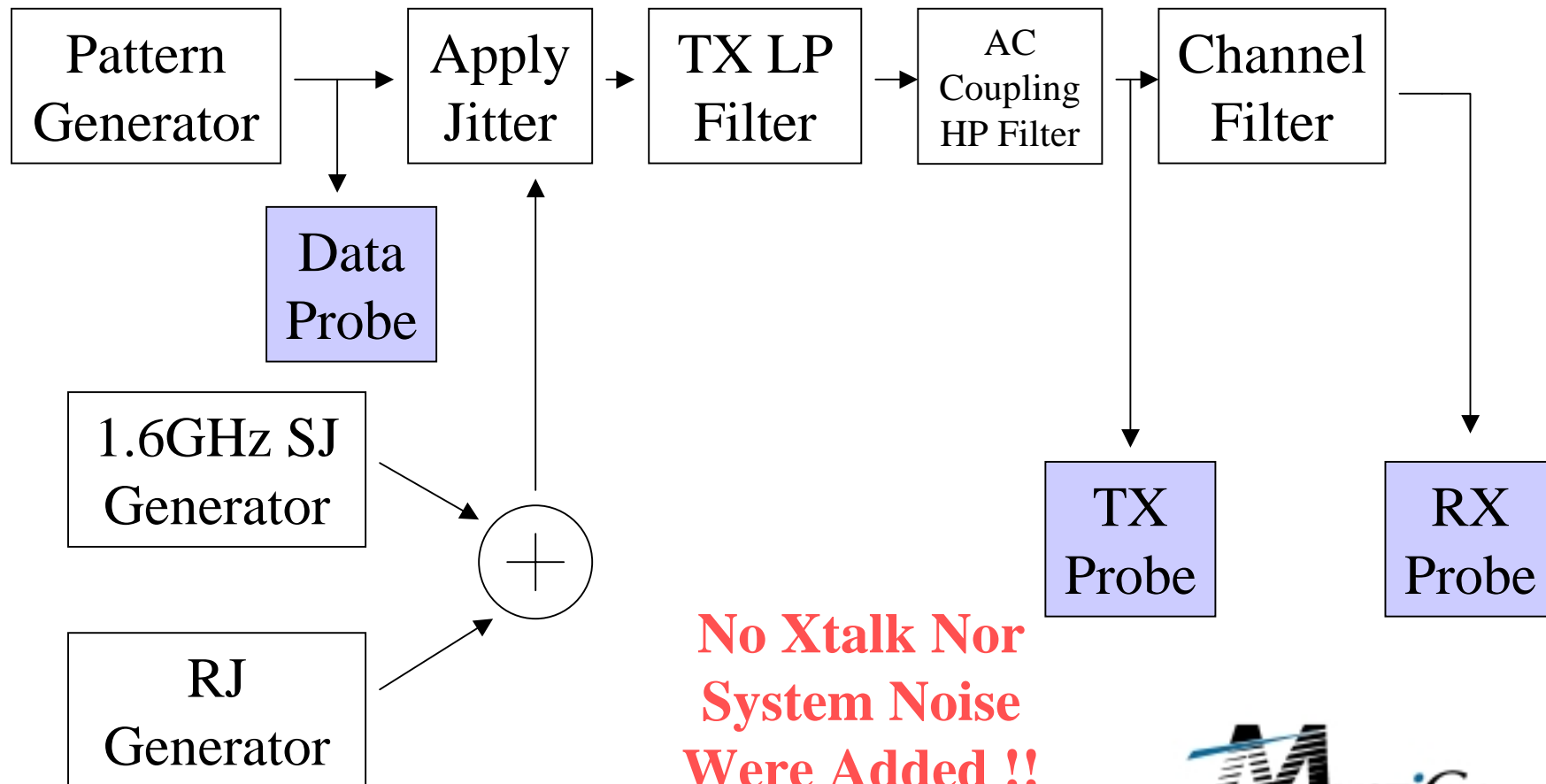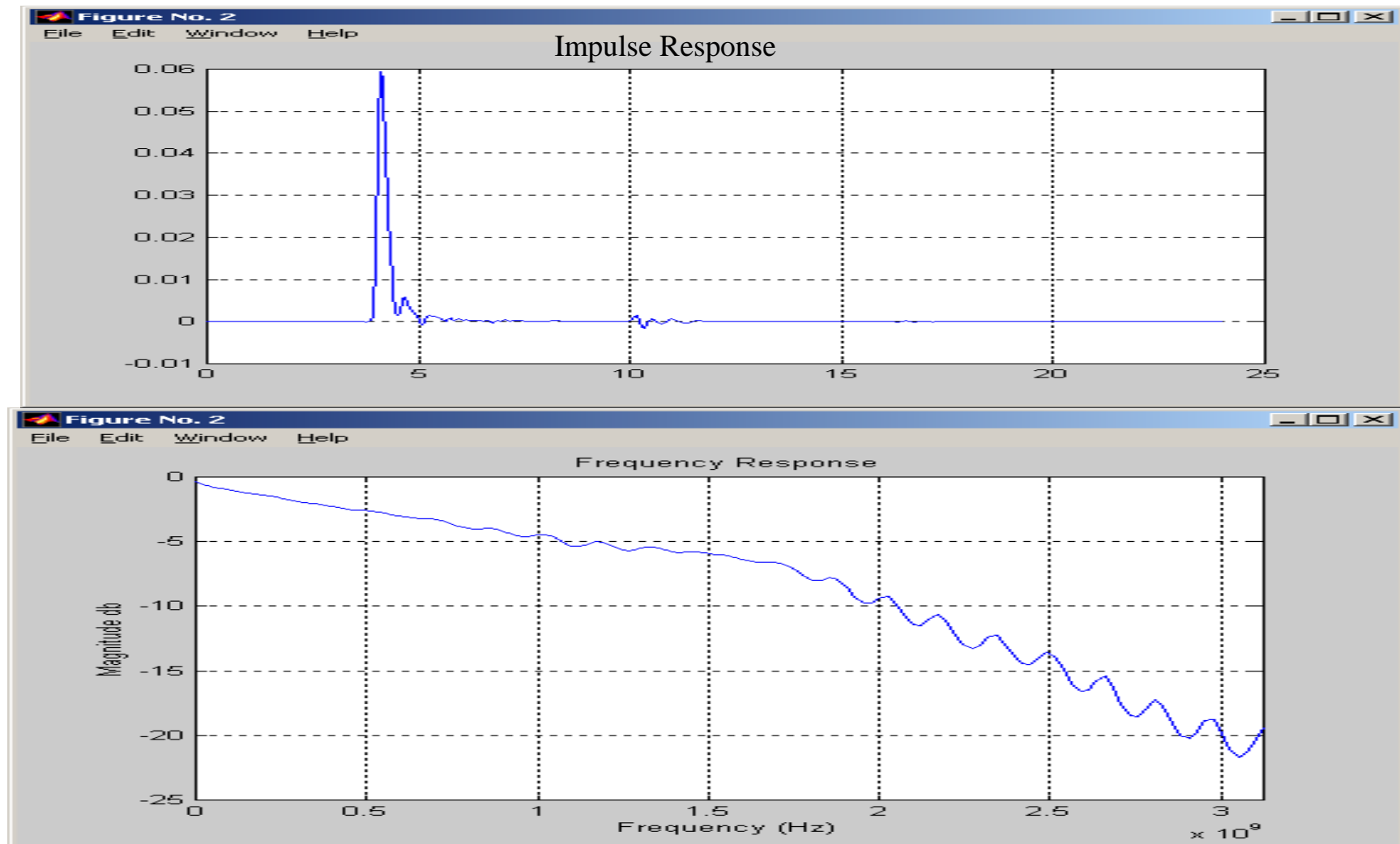
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Data Patterns PSD

CJTPAT in red

ISI Killer Pattern in blue

Simulation Setup

Pattern Generator → Apply Jitter → TX LP Filter → AC Coupling HP Filter → Channel Filter

Data Probe

1.6GHz SJ Generator

RJ Generator

TX Probe

RX Probe

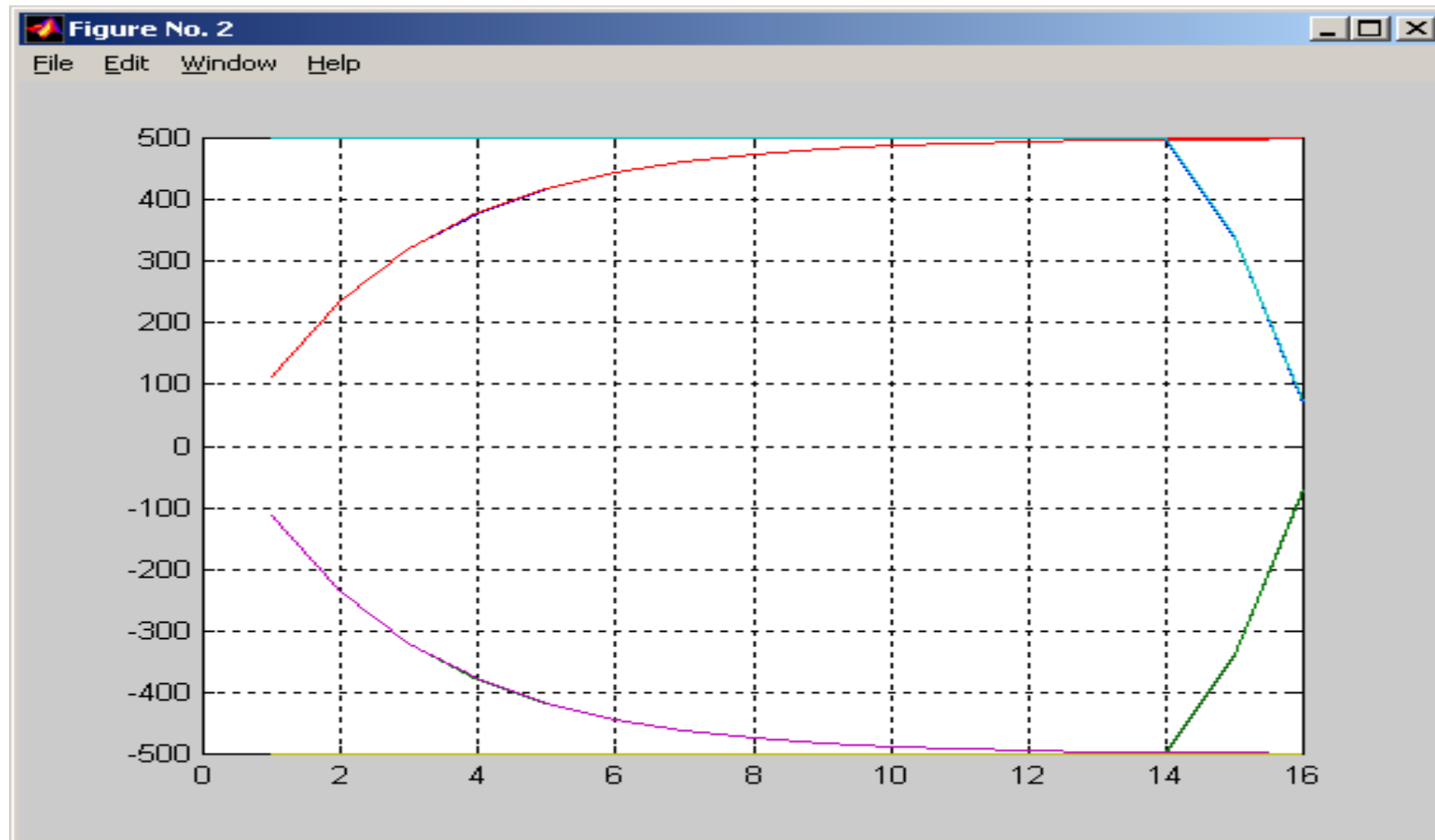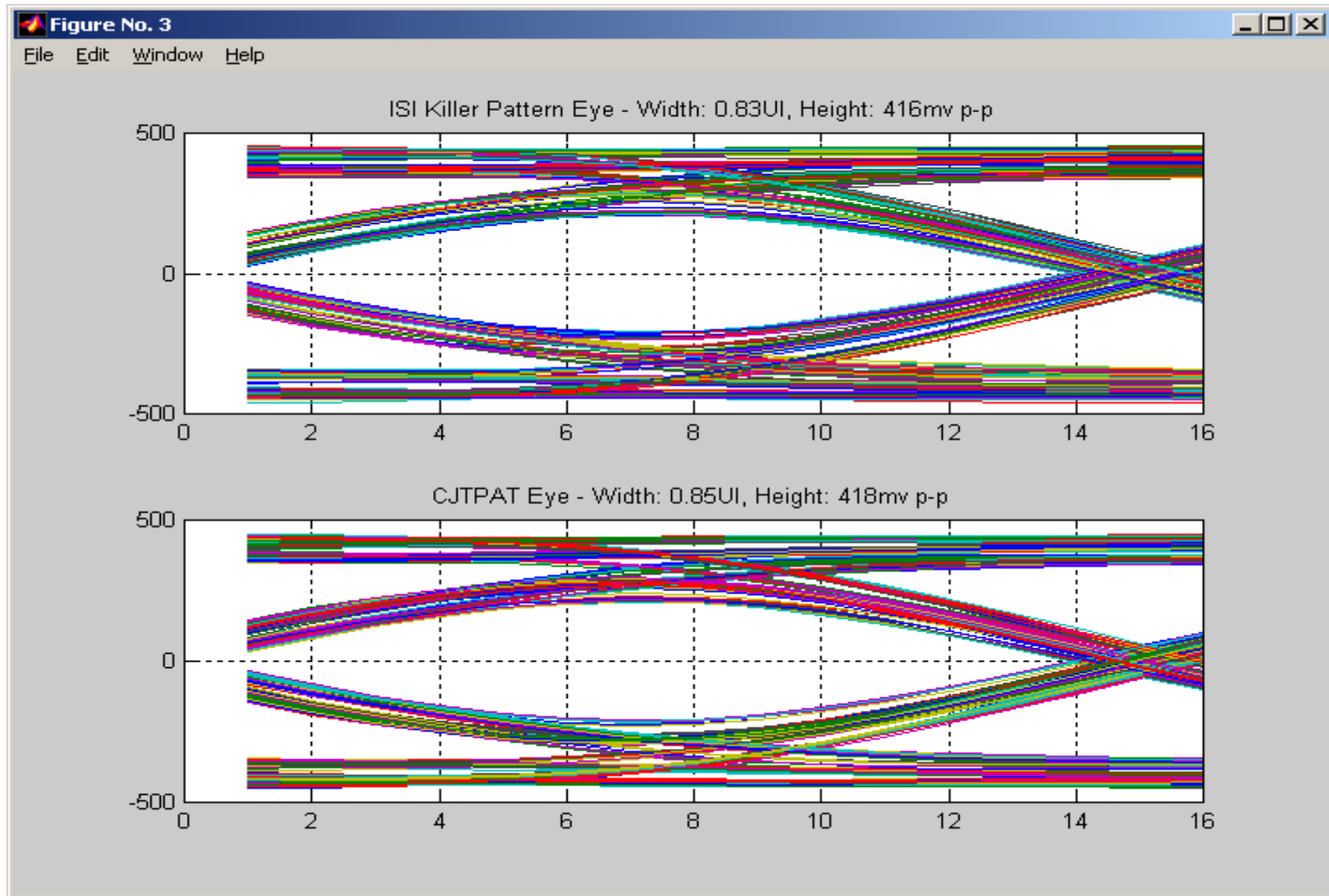**No Xtalk Nor System Noise Were Added !!**

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The Channel

Based on the file IEEE_CH_21_Final.txt
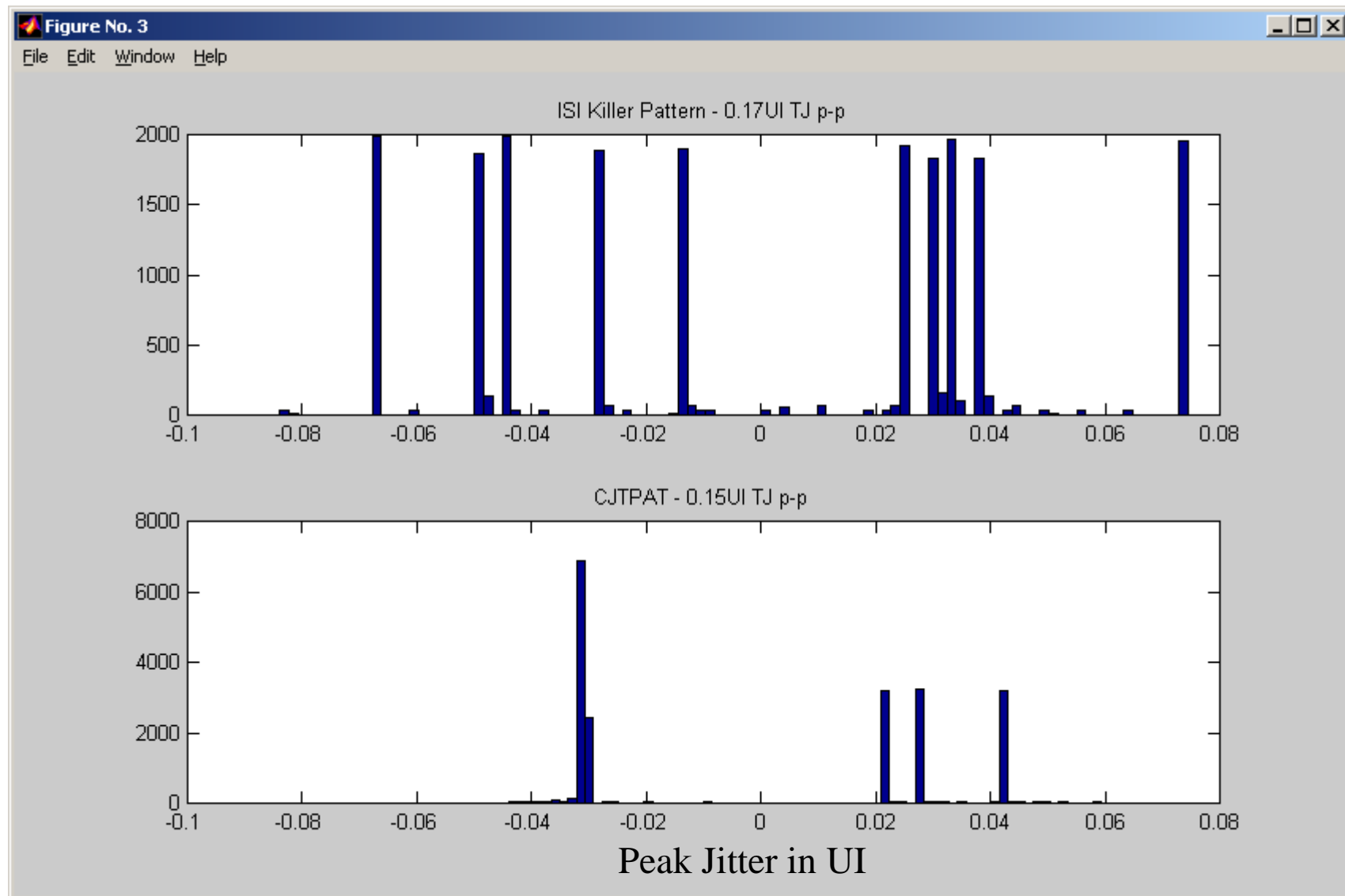sent by Anthony 9th January 2001
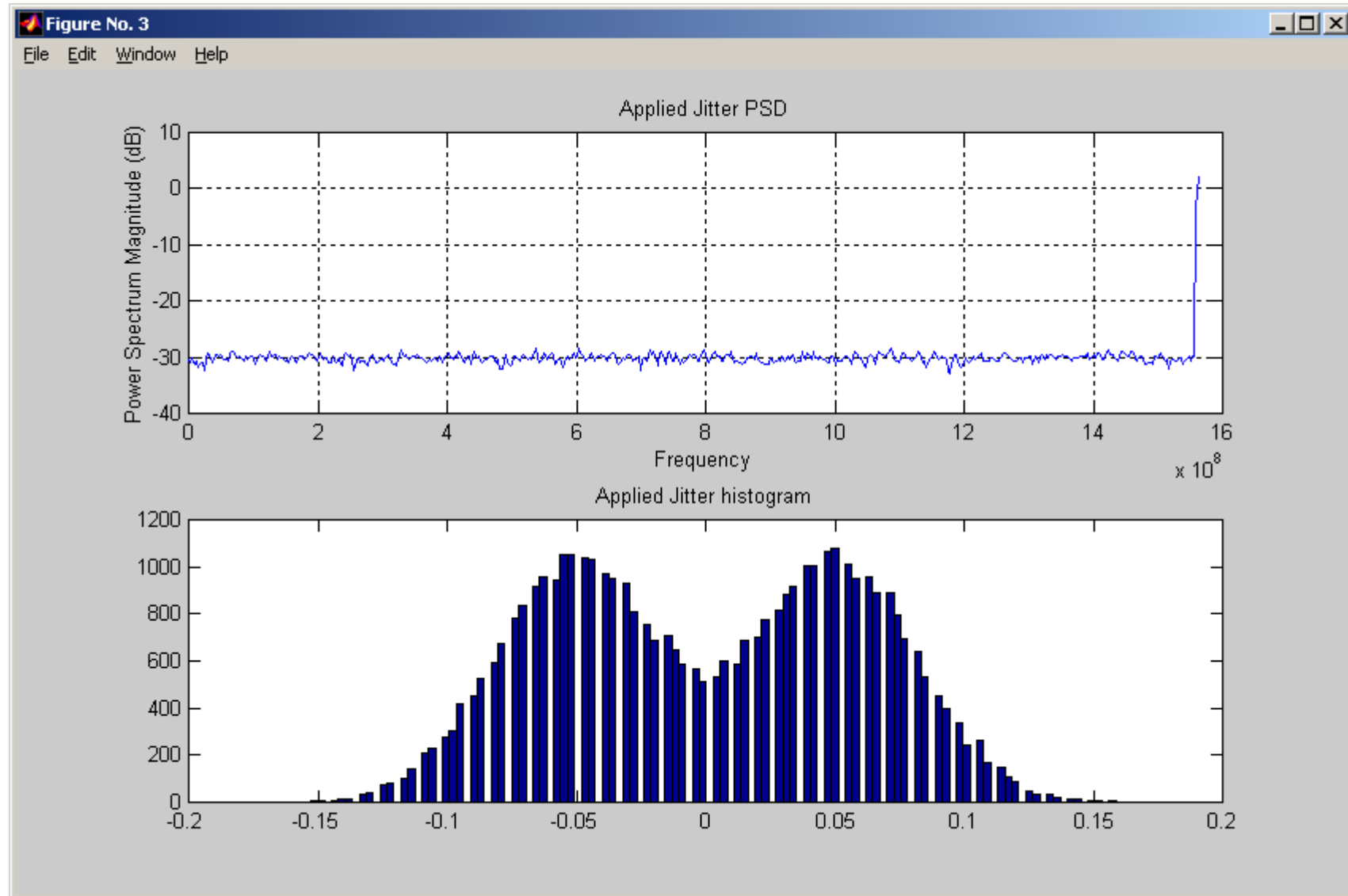
TX Eye – With Out Applied Jitter

RX Eyes

RX Jitter Histograms

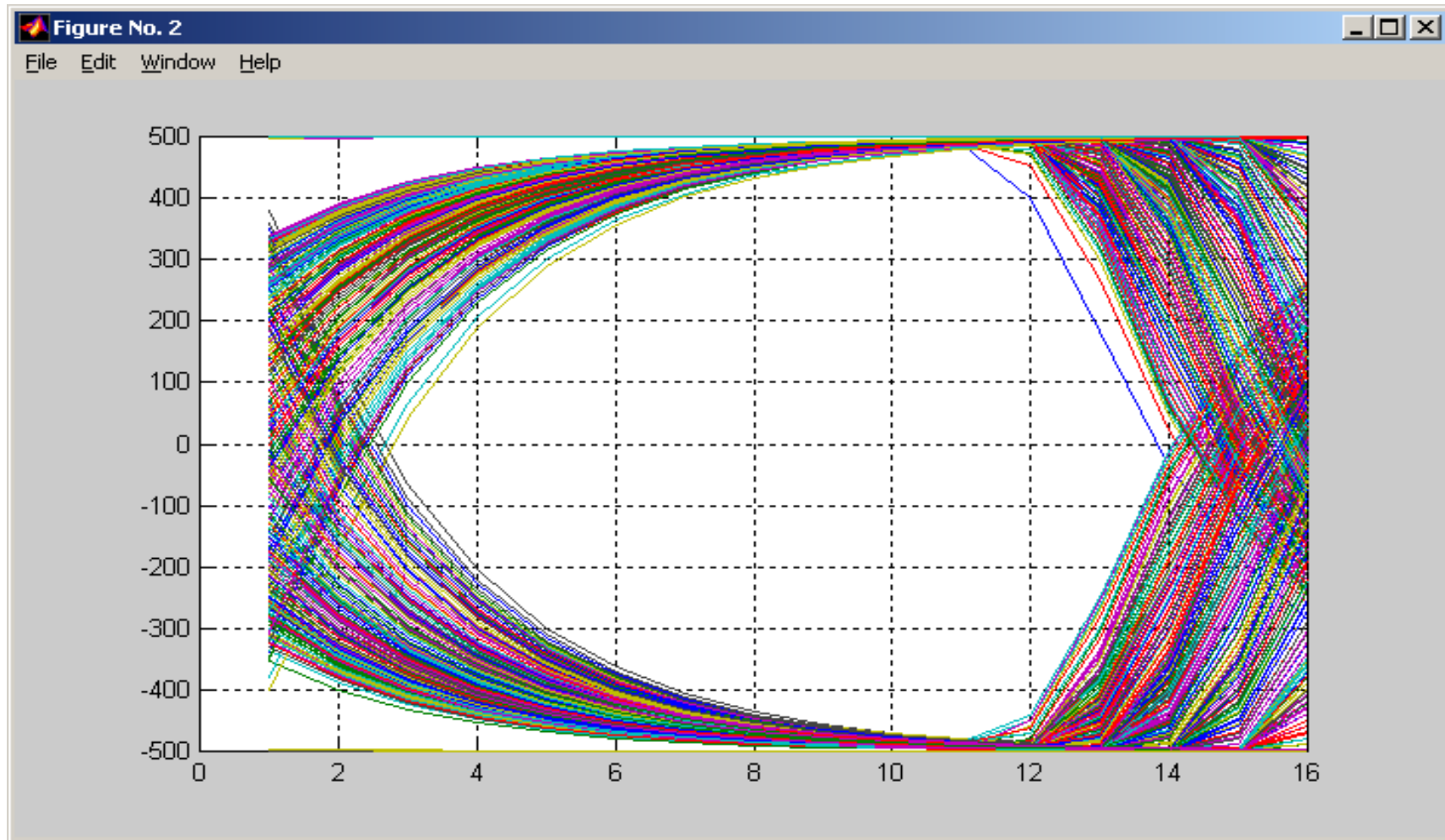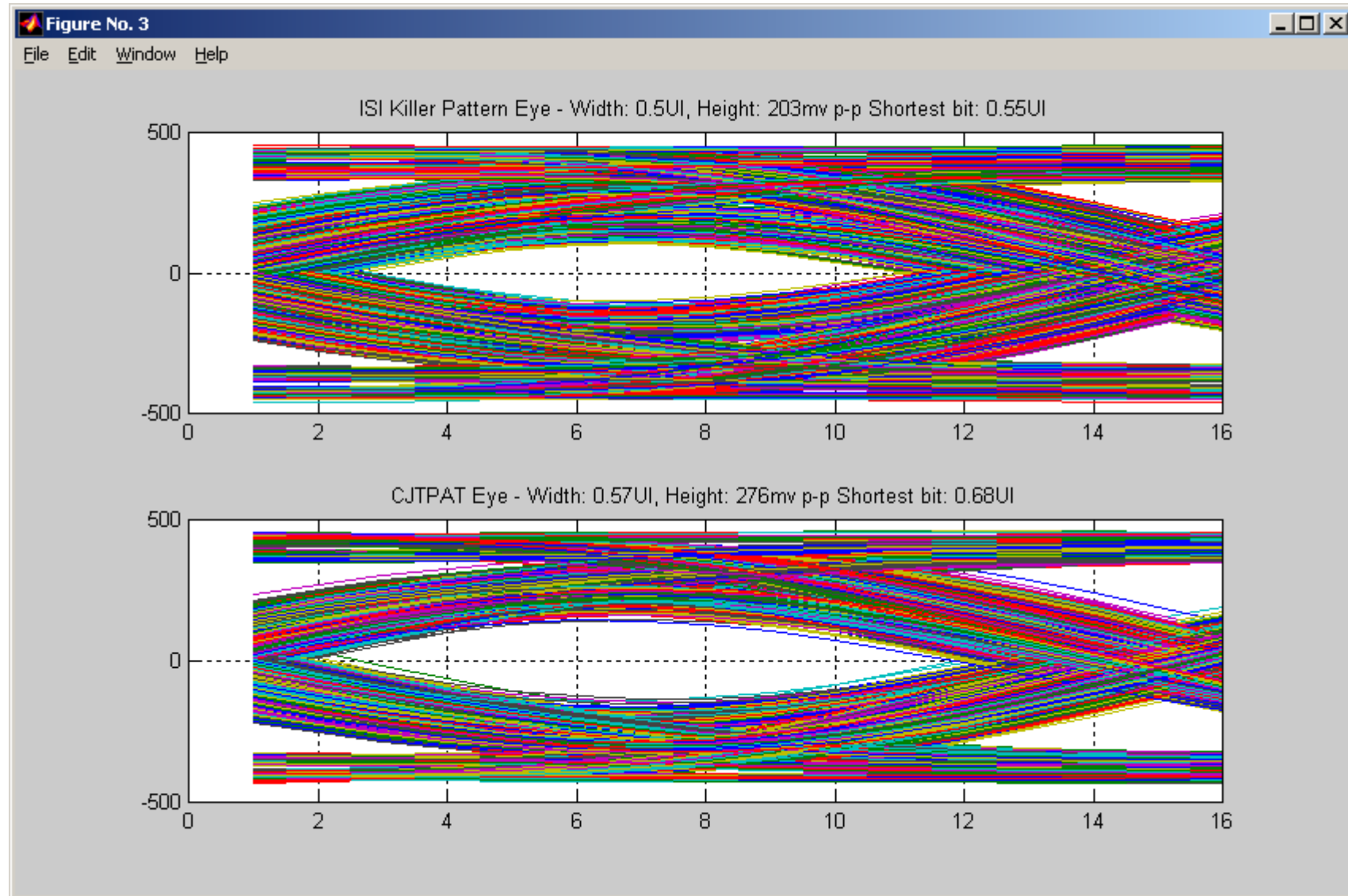# Appling 0.24UI RJ + 0.1UI HF DJ
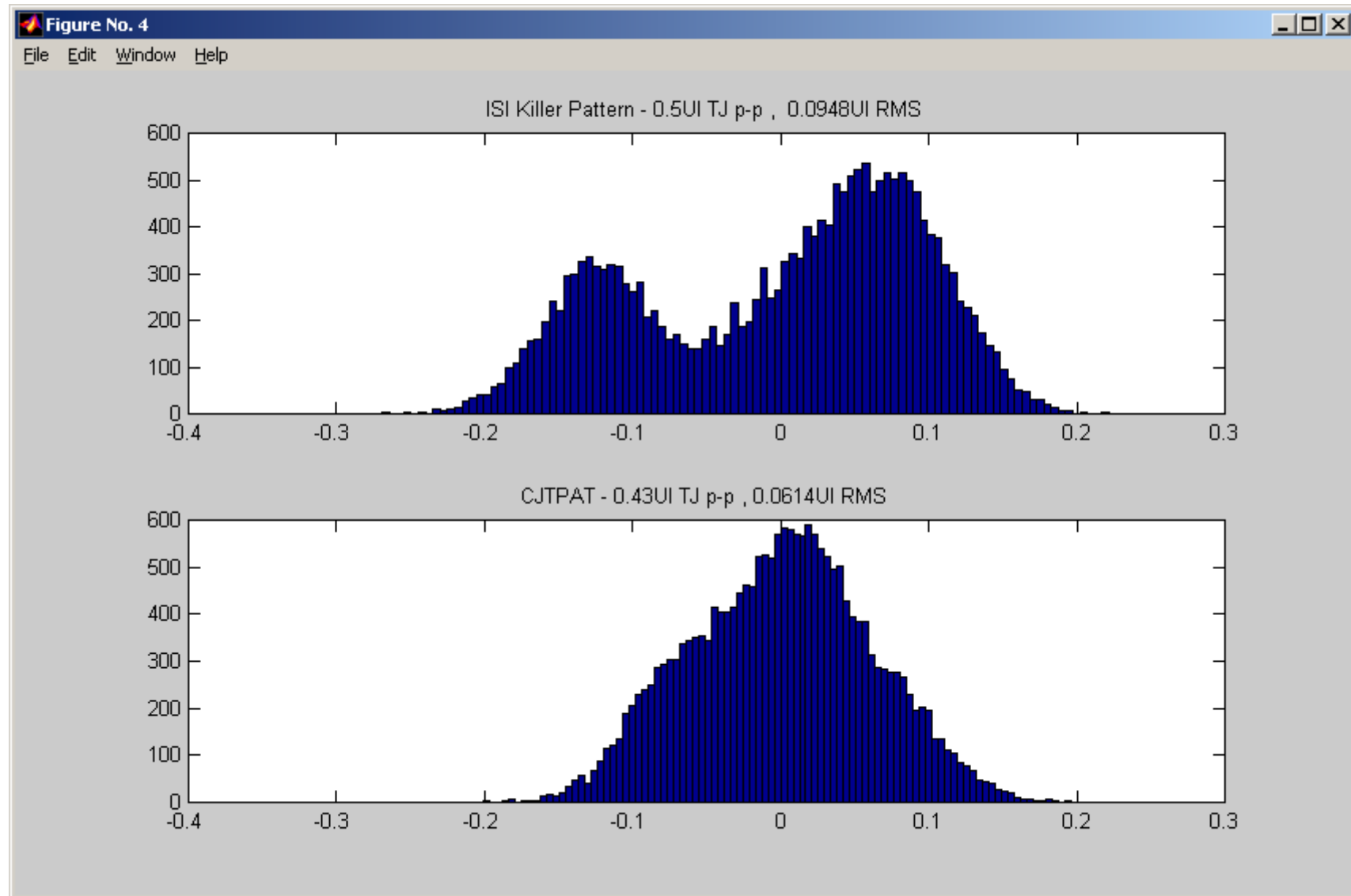
TX Eye With The Applied Jitter 0.24UI RJ + 0.1UI HF DJ

RX Eyes

RX Jitter Histograms

In Addition We Have More Jitter Contributors Within The Receiver

- RX PLL RJ and DJ

- Comparators offsets

- Receiver Cross Talk and other noise.

- Receiver capacitance (additional low pass filter).

- Jitter created by the CDR algorithm / circuit.

The probability for decision error depended directly upon the combination of these jitter components among themselves and with the jitter exists in the incoming signal

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Summery

• The ISI Killer pattern creates more jitter at the entrance to the receiver in terms of peak to peak and density.

• CJTPAT creates such a jitter that will cause the worst CDR algorithm / circuit jitter addition.

• The relation between the different receiver jitter contributors is very implementation depended.

• In some implementations the ISI Killer pattern will cause more decision errors.

We propose to combine between these two pattern to create the 8b/10b IKJPAT.

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IKJPAT

167 7E's

1   74

1   7E

1   AB

51   B5's

1   5E

1   4A

4   7E's

1   FE

128   IKSEQ (which is F4 Followed by EB)

Repeating this 484 chars sequence will ensure "real IKJPAT" in 50% of the time.

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