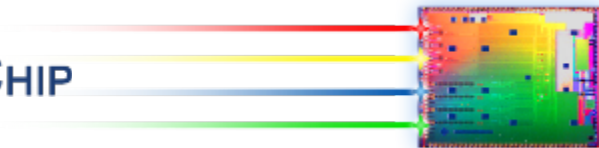


# TDECQ measurements vs Rx ref BW for T & T/2 spaced equalizers

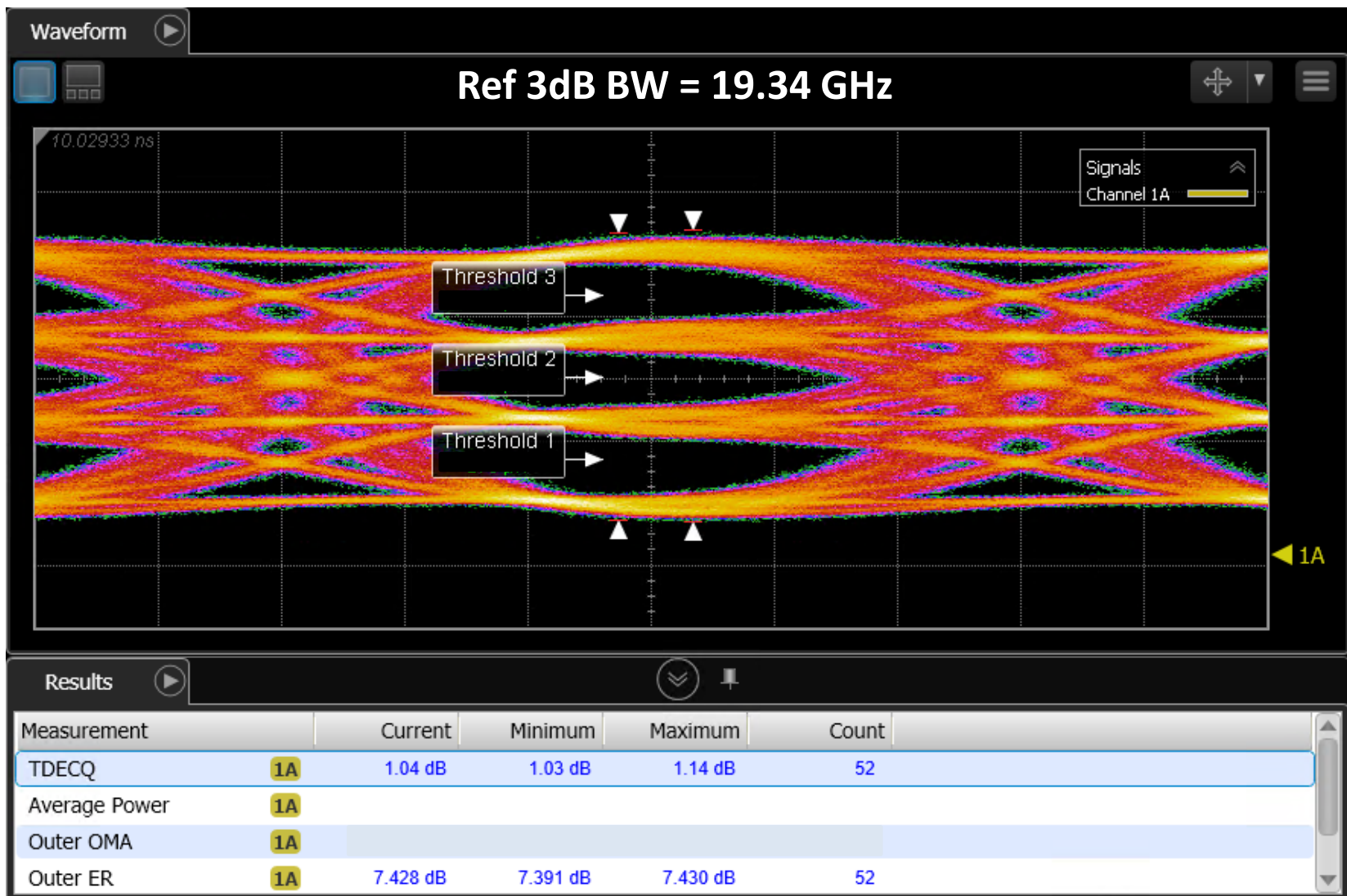
Brian Welch

FIBER TO THE CHIP



- Measurements taken on a 26GBD-PAM4 transmitter
- Measurements taken for both T-spaced and T/2-spaced 5 tap equalizers
- RX reference varied from 0.5x baud rate to 0.75 x baud rate (in 0.05 x increments)
- Measured using a Keysight N1092A DCA-M
  - SIRC enabled
- Using PRBS9 and 1m SMF

# Unequalized TX Waveform



# Equalized TX Waveform (Example)

The screenshot displays the Keysight Eye/Mask software interface. The main window shows a waveform plot with three horizontal threshold lines labeled Threshold 1, Threshold 2, and Threshold 3. The plot shows a signal with a complex, multi-lobed structure. The Results table below the plot provides the following data:

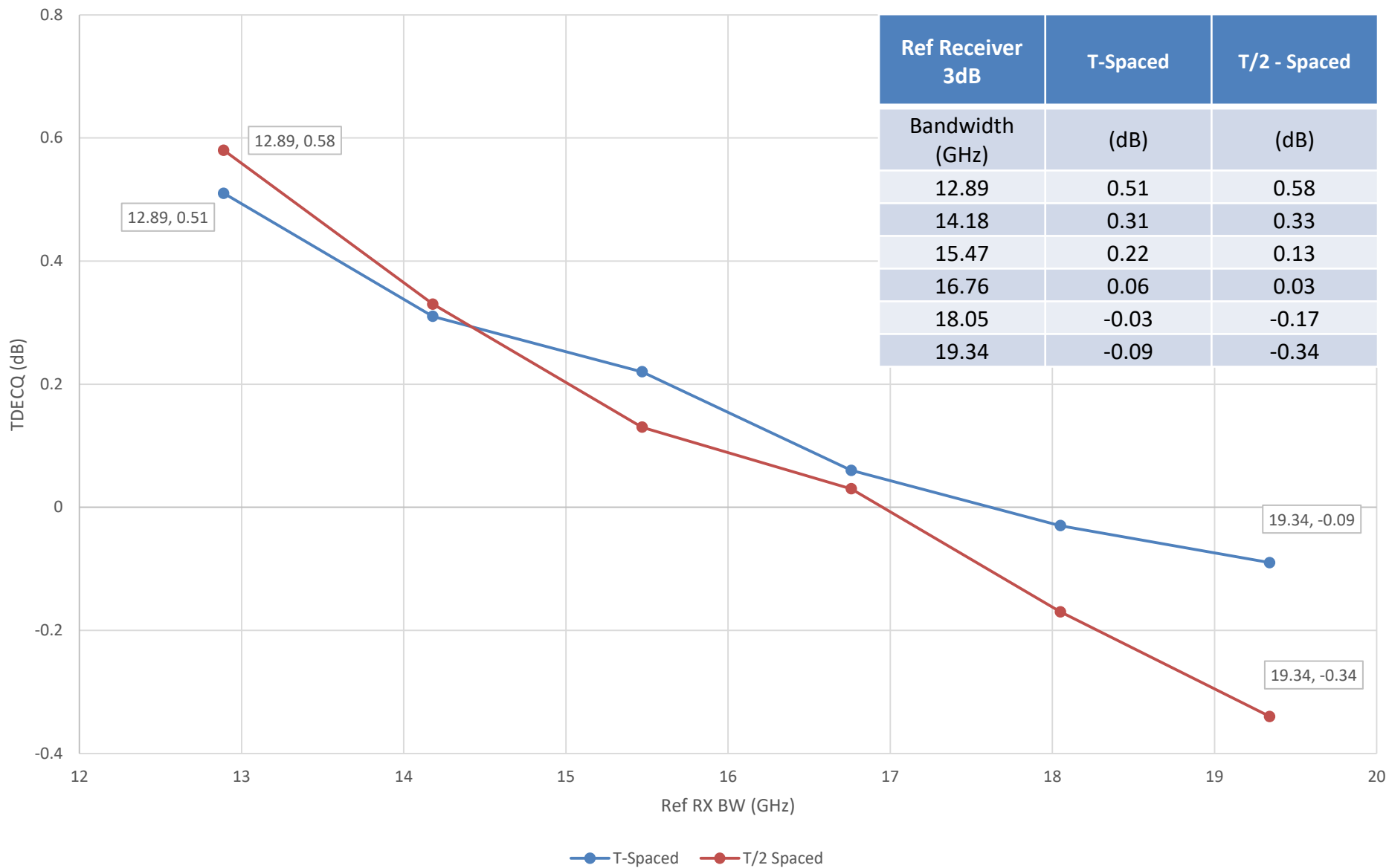
Measurement	Current	Minimum	Maximum
TDECQ	-0.33 dB	-0.34 dB	-0.29 dB
Outer OMA			
Outer ER	7.465 dB	7.438 dB	7.472 dB

Overlaid windows include:

- (F1) TDECQ Reference Equalizer Setup:** Shows a Custom preset with 2 Taps per UI, 5 Number of Taps, and 2 Precursors (highlighted in red). Tap values are: -0.100717, 0.151822, 0.803434, 0.170852, -0.025391. DC Gain is 1.00000.
- Channel 1A System Impulse Response Correction Setup:** Shows Filter Rate set to 25.78125 Gbd (19.3 GHz) and Filter 3 dB Bandwidth (4th order Bessel) set to 19.34 GHz. Wavelength is 1310 nm.

A block diagram at the bottom right shows a signal path from 1A through a TDECQ Equalizer to F1.

# TDECQ vs Ref RX BW



# Conclusions and Recommendations

- TDECQ penalty for reducing reference RX BW from 0.75 x baud rate to 0.5 x baud rate is 0.6 – 0.9 dB
  - Smaller penalty for T-spaced equalizers than T/2-spaced
- Higher reference RX BW performs better for both T-spaced and T/2-spaced equalizers
- Even with a reduced RX filter BW TDECQ values below 1 dB are readily achievable
  - **Suggestion:** Do not increase the effective min TDECQ from the D3.2 value of 1.0 dB