ADVANCED EYE ANALYSIS FOR MIPI D-PHY

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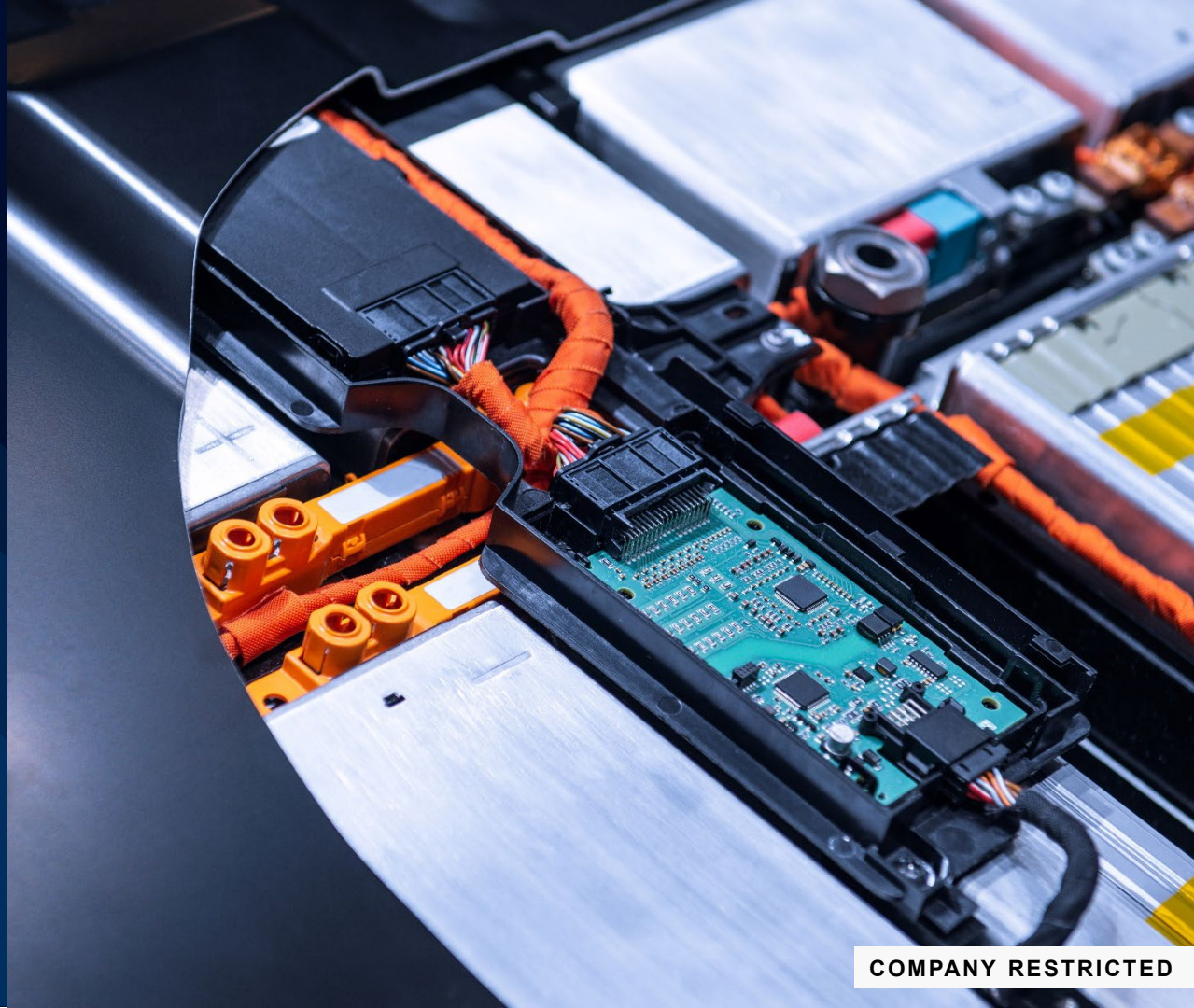
90 YEARS
OF ENSURING A SAFER AND CONNECTED WORLD

ROHDE&SCHWARZ
Make ideas real

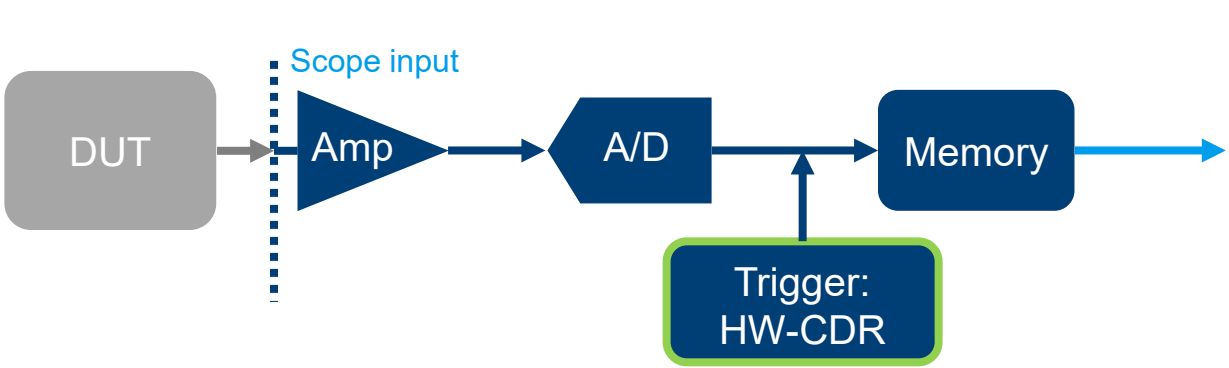
CONTENT

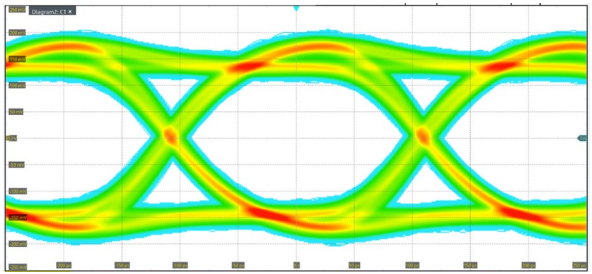
1. CDR Trigger
2. Advanced Eye Analysis
3. How to debug
4. Q&A



HW-BASED CLOCK-DATA-RECOVERY TRIGGER

- Eye Analysis based on Hardware implemented Clock-Data-Recovery (CDR)
  - CDR is part of the Trigger circuitry
  - CDR locks once and runs continuously
  - CDR is applicable for both Eye approaches: Bit sequence and Individual bits („Live Eye“)





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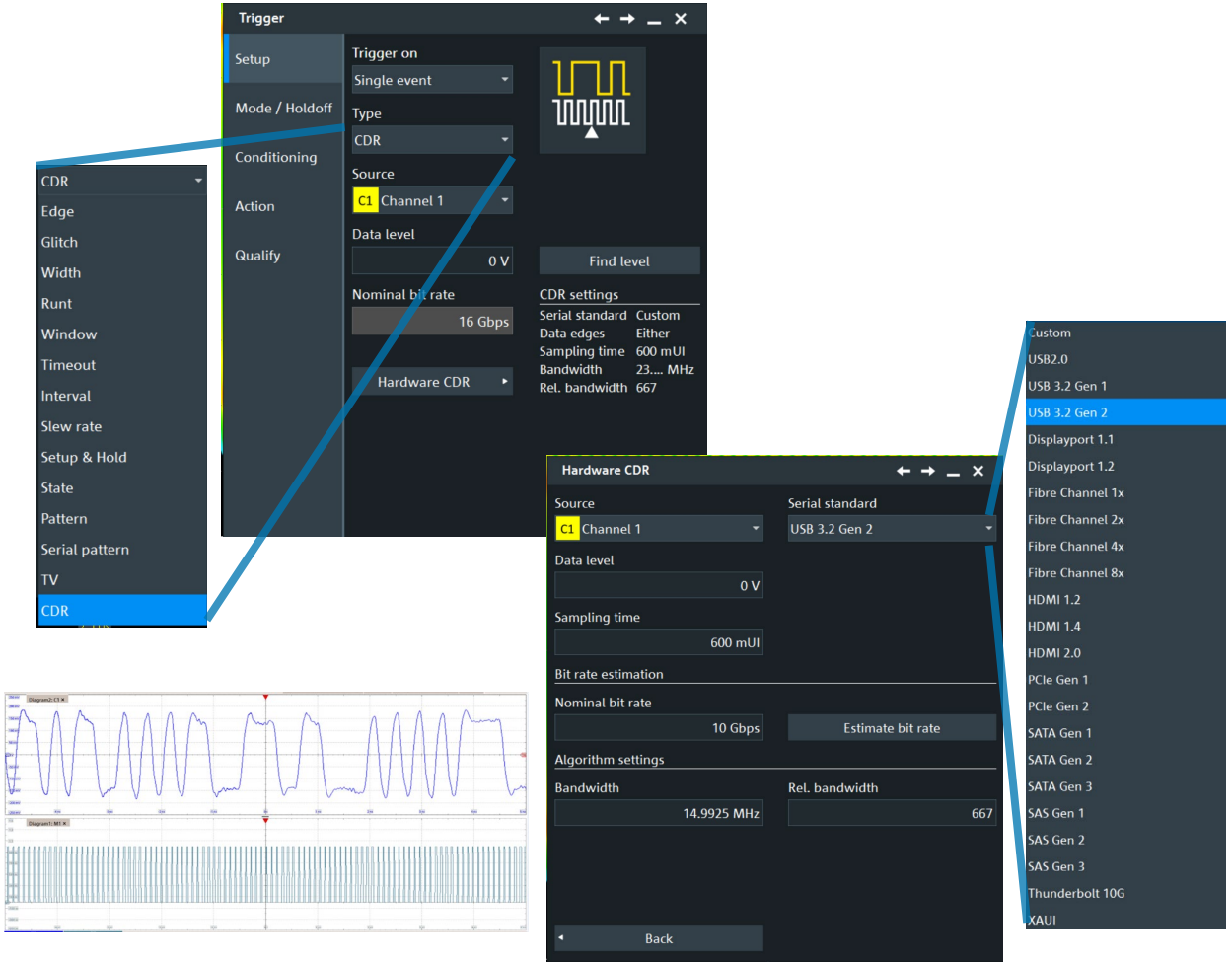
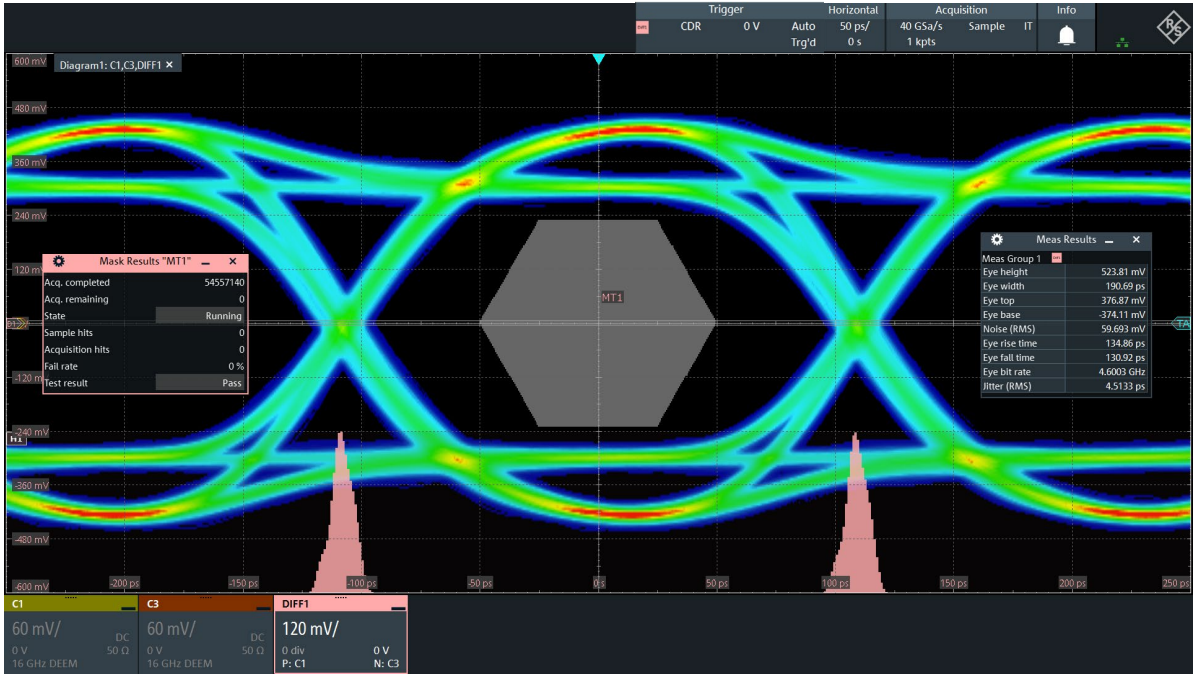
DETAILS OF CDR TRIGGER

- Source:
  - any analog channels
- Combinable with:
  - differential signal math and real-time deembedding
- Nominal bit rate:
  - 21 kbps to 16 Gbps
- Configurable BW:
  - 1/500 to 1/3000 of norminal bit rate
- CDR timing can be saved as math waveform



HW-CDR TRIGGER FOR “LIVE EYE”

- Options: RTP-K136/137
- HW-CDR up to 8/16 Gbps
  - Trigger individual bits based on embedded clock
- Benefits
  - Fast results due to high acquisition rate (>400,000 max)
  - Continuously CDR running as time reference
  - Combinable with HW implemented Histogram and Mask Test
  - Combinable with Realtime Deembedding

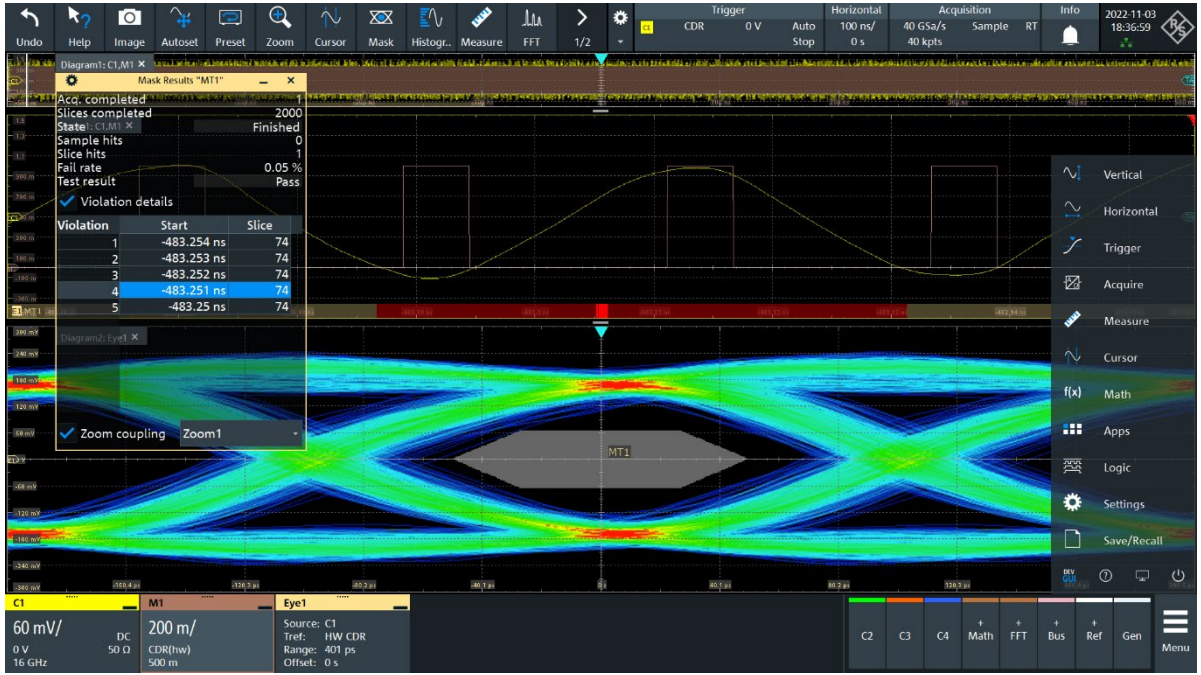


Signal-integrity debugging:

- Fast glance on Jitter / Noise
- Long-term monitoring
- Use Mask and Histogram

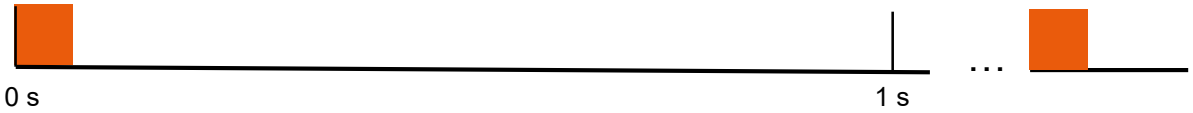
HW-CDR TRIGGER FOR ADVANCED EYE ANALYSIS

- Options: RTP-K136/137
- HW-CDR up to 8/16 Gbps
  - Bit folding based on continuously running HW-CDR
- Powerful capabilities
  - HW-CDR as Math available
  - Powerful Filter & Qualify options
  - Saving of Data Eye
  - Automated eye measurements
  - Mask test w/ EyeStripe function
  - Mask test library for typical interface standards

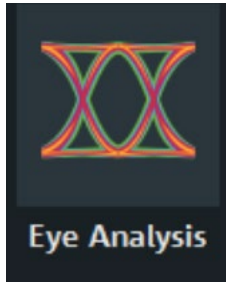


Signal-integrity characterization:

- Based on a long bit sequence
- Transmitter output and signal path characteristic
- Use Mask and Histogram

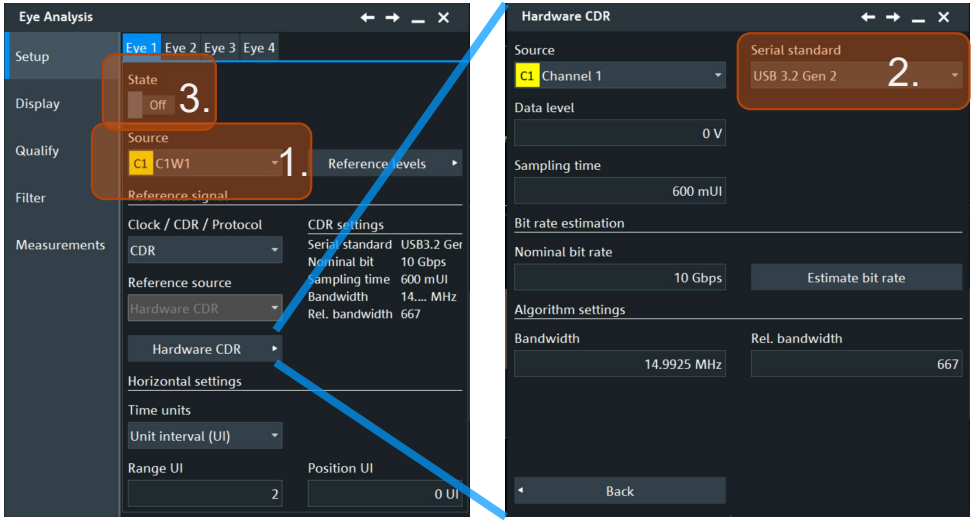


ADVANCED EYE ANALYSIS
EASY SETUP IN 3 STEPS



Quick start with Eye Analysis

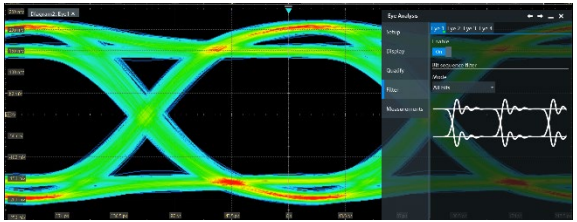
1. Select Source
2. Hardware CDR: Select Serial Standard
3. Set State: On



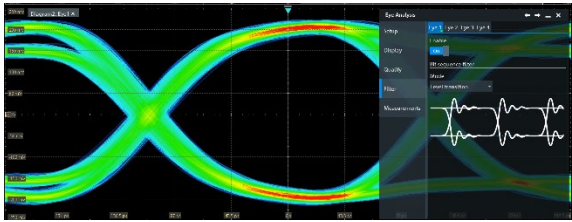
ADVANCED EYE ANALYSIS
TUNE YOUR SETUP

Advanced settings:

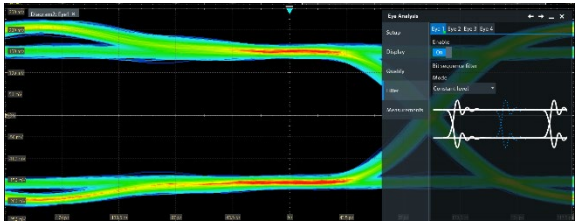
- Display:
  - color table, persistence,
  - „Eye stripe“
  - Slices per acq. (default 2000, max. 2.5 M)
- Qualify:
  - Gate
  - Signal
- Filter:
  - All bits / level transition / constant level
  - Bit pattern



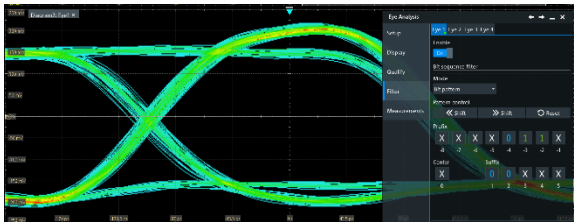
All bits



Level transition



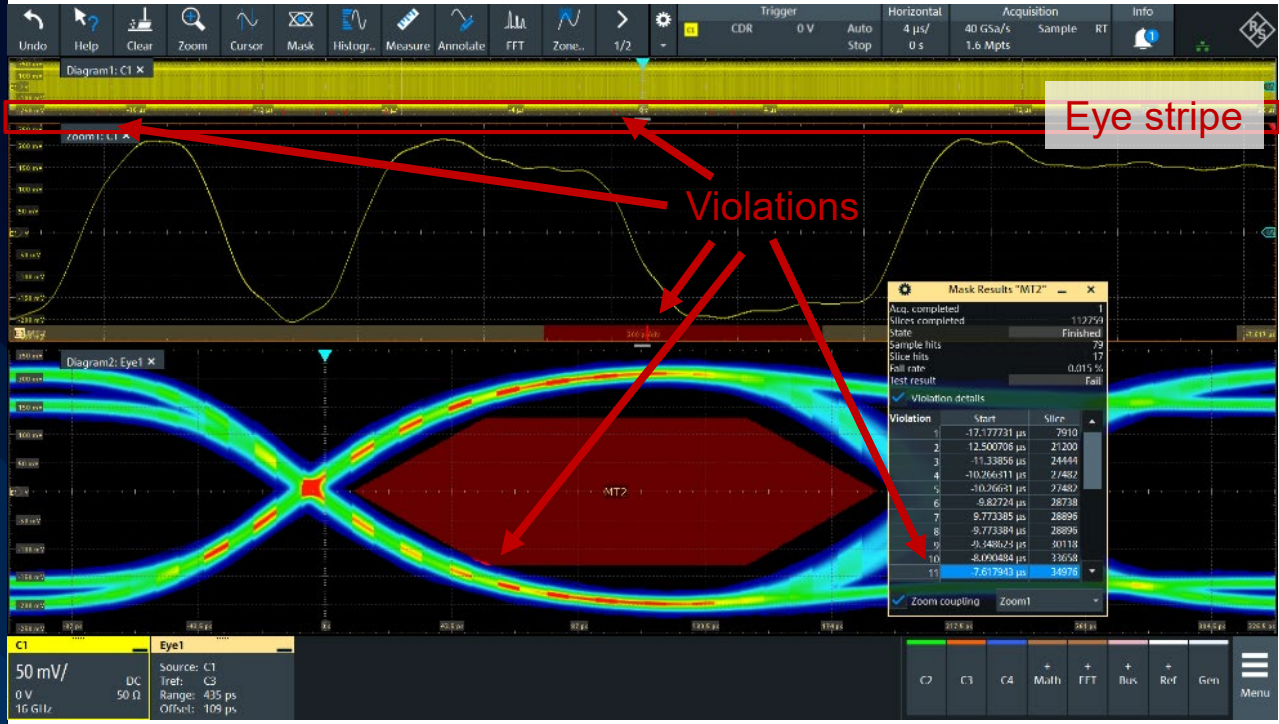
Constant level



Bit pattern

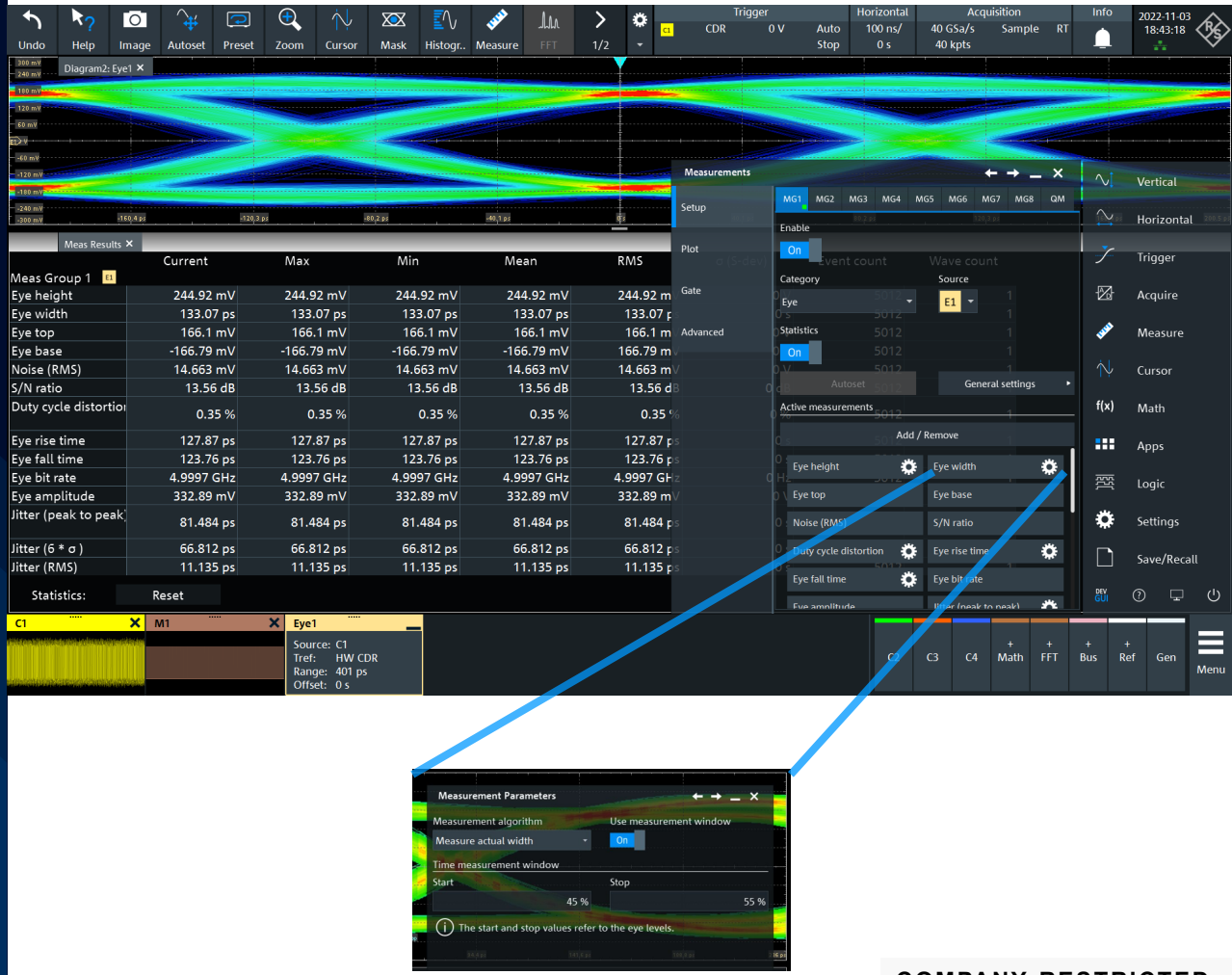
EYE STRIPE

- Couples mask violations with position in waveform
- Easy navigation between violations
- Coupled zoom to investigate details
- Time-correlation to other signals possible



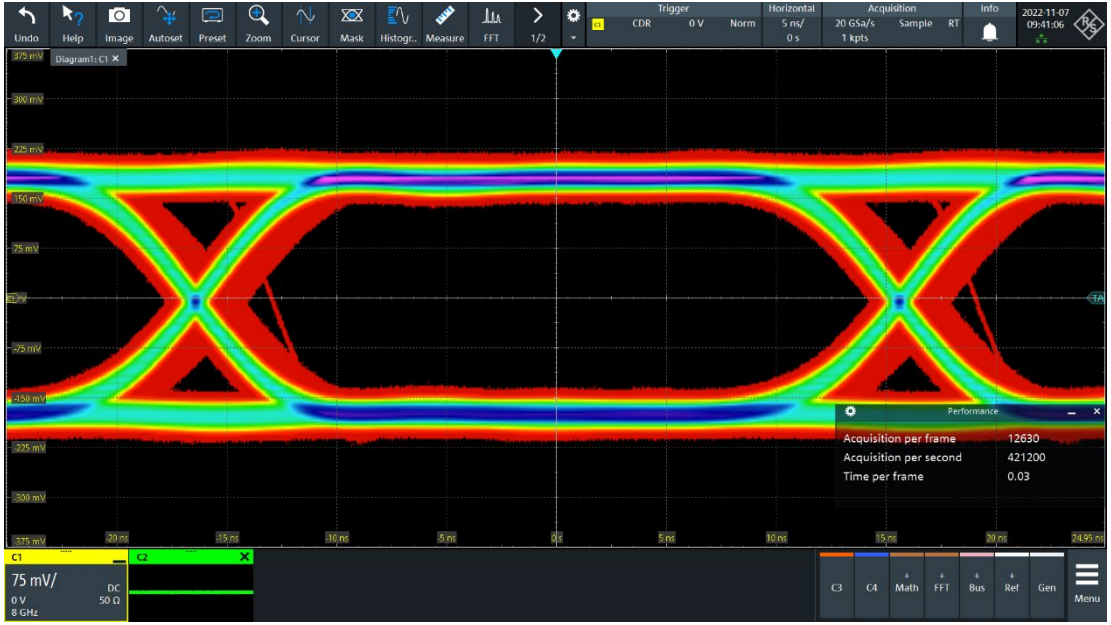
AUTOMATED EYE MEASUREMENTS

- 18 automated measurements
- Configure detailed measurement parameters



PERFORMANCE
LIVE EYE

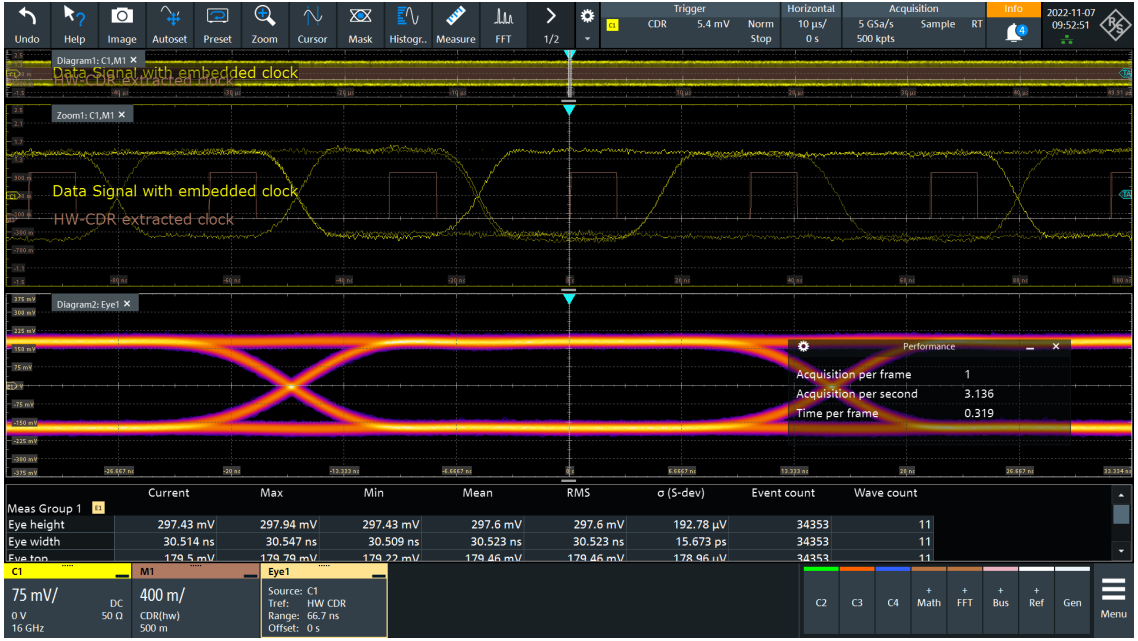
- Fastest: >420,000 UI/s
  (20 GSa/s mode, RT, 1 kpts, dot)
- USB Demo (5 Gbps): ~200,000 UI/s
  (40 GSa/s mode, IT)
- Minor impact of Analysis tools:
  - Mask test
  - Histogram
  - Automated Eye measurement



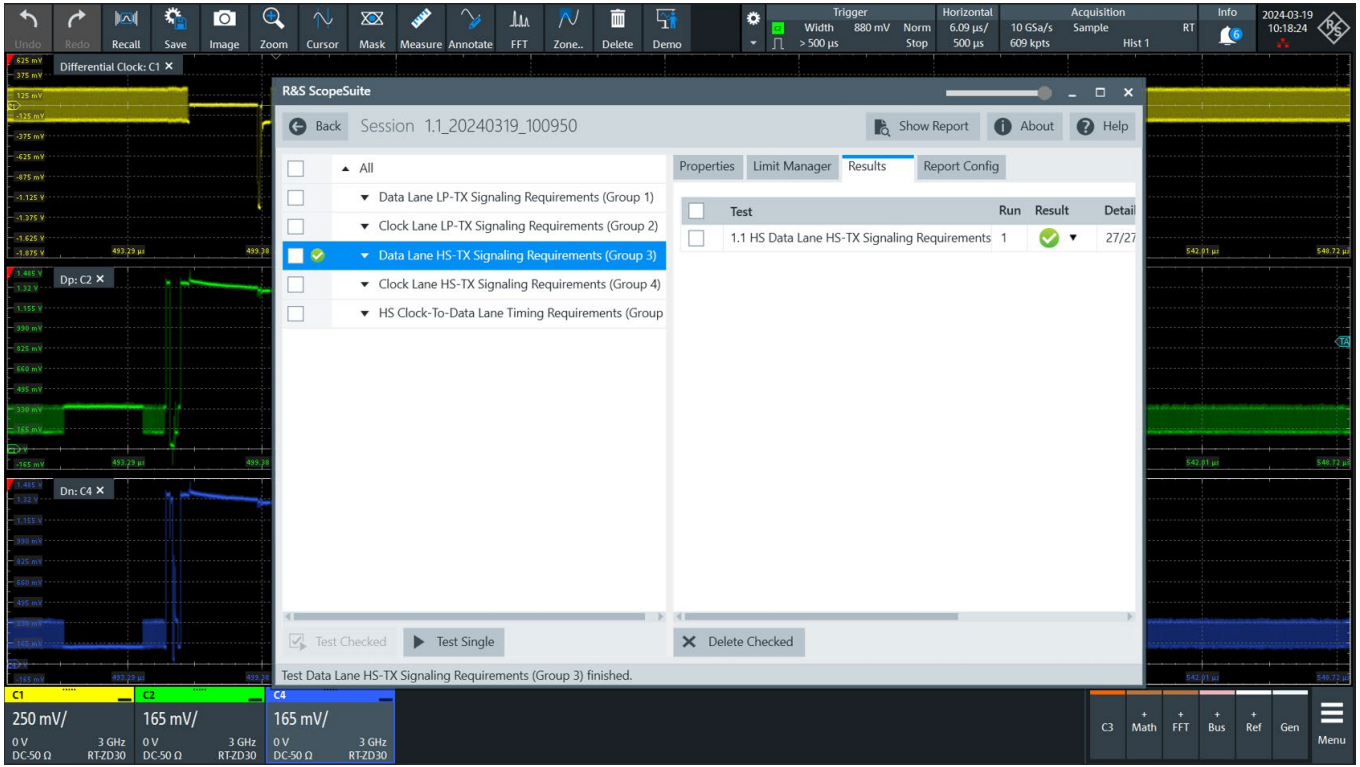
PERFORMANCE
ADVANCED EYE

- Fastest: ~10,000 UI/s
- Further acceleration is planned

- Minor impact of Analysis tools:
  - Mask test
  - Histogram
  - Automated Eye measurement



COMPLIANCE TEST



ADVANCED EYE ANALYSIS

DECODE

R&S OSCILLOSCOPE PORTFOLIO

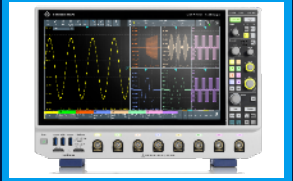
RTH1000
60 MHz … 500 MHz

RTC1000
50 MHz … 300 MHz

RTB2000
70 MHz … 300 MHz

RTM3000
100 MHz … 1GHz

MXO 4 Series
200 MHz … 1.5GHz



MXO 5 Series
100 MHz … 2 GHz

RTO6
600 MHz … 6 GHz

RTP164
4 GHz … 16 GHz

HANDHELD | 1000 | 2000 | 3000 | 4000 | 5000 | LAB | PERFORMANCE

Cost optimization design
Analog triggering

Performance optimization design
Digital triggering

Q & A