



# SCiCHART

CASE STUDY



## JKI Semiconductor Protocol Logic Analyzer

SciChart transforms terabytes of semiconductor data into actionable insight in real time — enabling engineers to debug faster, test deeper, and innovate with confidence.



## Customer

JKI

## Industry

Semiconductors &  
Electronics

## Scope

3–4 SciChart consultants,  
4–5 months



# The Challenge

JKI, founded by Jongkoo Kang (25+ years in semiconductor testing), builds high-speed trace and verification tools for advanced memory technologies. Their flagship Protocol Logic Analyzer faced challenges that pushed traditional WPF charting to its limits →

- Massive scale: terabytes of data with hundreds of billions of points.
- Precision requirements: nanosecond-level analysis demanded a double-scale time axis.
- Performance bottlenecks: default WPF charts struggled with text rendering, memory usage, and responsiveness under load.
- High interactivity: engineers needed smooth zooming, panning, and annotation of billions of points in real time.
- Modern UX: the tool required scrollbars, overview navigation, and drag-and-drop channel reordering to be practical for everyday use.

Without a breakthrough, JKI's analyzer risked being too slow and cumbersome for semiconductor engineers working at nanosecond resolution.

SciChart deployed a specialist team to design a custom high-performance visualization layer in WPF that could meet these extreme demands.

## Key Innovations Included:

### Memory-efficient data handling

- Implemented `UniformXyDataSeries` to eliminate explicit X-values, reducing memory use and speeding up rendering of terabyte-sized datasets.

### Custom Visualization Components

- Double-scaled nanosecond axis for ultra-precise timing.
- *Protocol Chart* for event visualization across time spans, optimized for performance.
- Bus Chart to group/ungroup channels, switch binary/decimal formats, and handle intersections without performance loss — overcoming WPF's default slow text rendering.

### Advanced Navigation & Interactivity

- Smooth zooming, panning, and scrolling, even when text was visible.
- Rubber-band zoom, vertical/horizontal scrolling, and an overview control for navigating terabyte files.
- Channel drag-and-drop reordering with real-time visual feedback.

### Measurement & Annotation Tools

- Custom timing markers (single or paired) that stick to signal alterations.
- Fully customizable annotations (comments, colors, tooltips).
- Visual feedback for selections, zoom ranges, and timing markers.



# Special Features, And Why They Mattered

- Double-Scaled Axis → Delivered nanosecond-level resolution.
- Protocol Chart → Made event sequences explorable across massive time ranges.
- Bus Chart → Solved WPF text rendering bottlenecks, enabling efficient signal grouping.
- UniformXyDataSeries → Reduced memory strain, essential for billion-point datasets.
- Advanced Navigation → Allowed engineers to move seamlessly between overview and detail.
- Channel Reordering → Improved usability during debugging sessions.
- Annotations & Markers → Enabled reliable, interactive signal analysis.



Each feature directly removed a performance, precision, or usability barrier that made semiconductor analysis impractical in standard WPF.

# The Result

JKI gained a state-of-the-art analyzer that could:

- Render billions of points in real time without exhausting resources.
- Deliver nanosecond-level resolution for cutting-edge semiconductor testing.
- Provide a smooth, modern user experience with fast interactivity and flexible UI.
- Increase the value of their products with custom charts and analysis tools unavailable anywhere else.



*"SciChart provided a solution that could draw billions of data points while minimizing resources, and customized charts and annotations that increased the value of our products. We solved problems that are difficult to solve with basic programming knowledge."*

JK Kang, CEO



# About SciChart

## — Why We're Chosen in Semiconductors

The semiconductor industry produces some of the largest, fastest, and most complex datasets in engineering: terabytes of trace files, billions of points, and nanosecond-level signals. Conventional charting tools simply cannot cope. SciChart is built for exactly these scenarios:

Find out more about SciChart at <https://scichart.com>

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Custom Engineering Solutions  
From Bus Charts to Protocol  
Charts, SciChart delivers domain-  
specific visualizations for  
semiconductor workflows. Flexible  
API allows engineering teams to  
tailor functionality to their unique  
needs.

Extreme Performance Render  
billions of points in real time with  
minimal system resources. Handle  
both historical replay and live  
streaming workloads at scale.

Rich Interactivity at Scale Smooth  
zooming, panning, annotations,  
and measurements — even on  
terabyte-sized datasets — give  
engineers the tools to explore,  
debug, and optimize.

Precision for Nanosecond Data  
Customizable axes and chart  
types enable nanosecond-level  
accuracy, essential for  
semiconductor testing and  
debugging.

Trusted Across Data-Heavy  
Industries SciChart also powers  
scientific research, medtech,  
defence, and oil & gas — fields  
where uncompromising  
performance is critical.