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SBAE Series, Universal Serial Bus (USB)

Analyzer, Exerciser, Device Emulator, OTG, DC Compliance



PRODUCTS
- PCI/PCI EXPRESS
- STORAGE/SAN
- USB
- WIRELESS
- ADAPTERS
- EXTENDERS
- BY MODEL NUMBER

SUPPORT
- TECHNICAL INQUIRY
- SALES INQUIRY
- SOFTWARE
- MANUALS
- DATASHEETS
- UPGRADE-REPAIRS

Unsurpassed Power and Performance

Building on several generations of USB development tools, Catalyst delivers the industry's most feature-rich USB solution. The powerful SBAE-30 is the first "**network-enabled**" USB analyzer. Catalyst's SBAE Series delivers a multitude of deep features, providing engineering professionals with unsurpassed coverage across protocol, electrical, emulation, and compliance test environments.

Analyzer | Host Exerciser | Device Emulation | OTG Exerciser | Timing Analyzer | DC Compliance Test Suite | Protocol Error Detection | Performance Analysis | Performance Characterization |

Available Models: SBAE30B-2X-ADC and SBAE30B-2X-EDH

USB Products

The SBAE-30 is an all-in-one USB development solution, from protocol analysis to active host/device emulation capabilities to instant characterization of design performance. This powerful tool, with an unprecedented array of deep features, is ideally suited for hardware, software, and system engineers in all phases of product development.

SBAE Series products are fully feature-integrated, consuming a minimum of bench real estate while providing a maximum level of features and depth.

SBAE-30 Series tools are operated by Catalyst's application software residing on a PC. The PC-to-SBAE control connection includes a user choice either LAN 10/100 or USB 2.0.

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Analyzer

In the analyzer mode, the SBAE provides two independent analyzer ports for non-intrusive capture of all USB packets and events. Capabilities are provided for capture of standard USB traffic at all speeds, including non-standard, user-defined speeds. OTG traffic is fully supported as well. The user is provided with the option to view the captured traffic in a Catalyst Trace view, timing view, or both views.

Two modes are provided for operating the analyzer; easy mode and advanced mode. In the easy mode, an extensive list of predefined trigger points are provided, and several convenient filters are available to exclude undesired USB traffic and events. The advanced mode provides a 32-level state sequencer, which provides complex control of the capture and trigger sequence.

Captured USB traffic is displayed in an easy-to-understand Catalyst Trace view with collapsible transfer/transaction display to quickly zero in on specific location of the bus traffic. Captured traffic can be saved to various formats, such as binary, text, and NRZI, as well as the popular Catalyst Trace view format. An extensive array of USB class decodes is provided for detailed decoding of class-specific transfers. These decodes can be user-edited with Catalyst's Advanced Script Language (ASL) editor. The ASL editor can also be used to create custom, proprietary decodes.

A detailed statistical report provides instant qualitative and quantitative information on the captured bus traffic, including a fast-search feature whereby the capture instantly jumps to the selected packet or event highlighted in the statistics report.

A data payload report breaks down captured payloads and provides its own statistical summary on this information, including a byte value distribution graph as well as additional quick-search features. Additional features include save-as-text, copy options, quick filters, and various display control and formatting options.

The analyzer can detect and trigger on several different USB protocol errors in real time, along with detection of numerous post-capture protocol errors.

Analyzer Features and Controls

- Protocol error detection
- Multi-state event triggering
- Non-standard speed support
- Time and event counters
- Transaction/packet/event search and filter functions
- Payload data report with associated data distribution chart
- Statistics on packets, events, transactions, transfers, errors, and performance
- Quick data search
- Save as text, NRZI, or standard format
- Export payload or packets/events captured for use by exerciser
- Upper-level protocol decodes and custom protocol editor interface
- Over-sampling timing mode

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Host Exerciser

The host exerciser enables the user to emulate a USB host for purposes of testing a USB device. Traffic generated by the exerciser is captured and displayed by the analyzer, providing the user a comprehensive understanding of test scenarios. All USB transfers, packets, and events can be constructed by an easy-to-use graphical interface. The user can modify packet fields, loop or iterate specified sequences, and control NAK and error retry characteristics. The exerciser is capable of accepting a very large data payload, automatically breaking it into several transactions and eventually generating a single transfer. A wide array of error generation features is available to test device reaction to illegal and malformed packets, events, or transfers.

Exerciser Features and Controls

- Automatically spreads large payloads over multiple transactions
- Record and playback of captured packets and bus events
- Adjustable bit width of packet fields and other error injection features
- Automatic retry of failed transactions (fully controllable)
- Loop selected exerciser sequences or entire sequence
- Control of host handshakes
- Replay captured payload data or call pre-defined data blocks
- One-click auto-build for insertion of complex control transfers

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Device Emulation

The device emulation feature simulates standard or non-standard device behavior, which is crucial to USB host developers. An easy-to-use GUI displays device hierarchy for quick configuration or descriptors and other configuration characteristics. Device handshakes are fully controlled, as are all device responses to the host, including pre-programmed errors, payload data, and configuration data.

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OTG Exerciser

The SBAE provides complete analysis and exerciser capabilities for OTG. All Details of OTG Sessions are captured and displayed, including HNP and SRP events. The OTG exerciser emulates either the A or B device, including a user-defined traffic sequences, response settings for data line/VBus pulsing, and full suite of error injection functions. Once defined and activated, the device emulator runs independent of other analyzer functions.

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Timing Analyzer

The timing analyzer over-samples USB traffic at rates to 1.44GHz and produces a waveform view of the D+ and D- lines to discover various electrically-oriented issues on the bus. Skew, jitter, EOP errors and several other anomalies are quickly identifiable in this mode. Timing captures can optionally be correlated with

the protocol view. Triggering the timing analyzer can be done either through the standard analyzer triggers or by direct definition of the states of the D+ and D- lines.

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DC Compliance Test Suite

A suite of Automated DC Compliance Tests is provided in both qualitative/quantitative and pass/fail formats, based on up-to-date compliance specifications. For DC current measurements, live values, averages, and peak measurements are graphically displayed. Inrush and VDroop tests are displayed in graph form, with voltage/current measurements displayed over time, along with quantitative and pass/fail displays. The analyzer also provides triggers for both VBus and operating current threshold values.

The DC Compliance Test Suite includes:

- Operating Current
- Suspend Current
- Unconfigured current
- VBus
- VDroop
- Inrush

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Protocol Error Detection

The SBAE real-time protocol error detection feature allows the user to detect & trigger on pre-defined protocol violations across all layers of the protocol, in real-time. The user simply selects the error, or errors, to be monitored and executes the capture. Errors detected cause the analyzer to trigger and display the error(s) at the trigger location in sync with the rest of the packets and events. Once the analyzer is armed with trigger on protocol error(s) it will continue to monitor the bus indefinitely until an error is detected or analyzer stopped by the user. Additionally, once a capture is made, the SBAE software automatically searches for more than 20 additional protocol errors.

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Performance Analysis

The real-time performance analysis mode provides a graphical "finger-on-the-pulse" indication of bus activity. Metrics include bus utilization, throughput, idle time, average data payload, ACK/NAK ratio and other important characteristics. The performance analyzer may be run with or without the exerciser. Custom performance items can be measured by building user-defined performance mathematical expressions.

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Performance Characterization

The real-time performance analysis feature can also be operated in conjunction with the exerciser, allowing the user to characterize a design under precisely controlled conditions. For example, the exerciser may be used to loop through an exerciser project of read commands, while the performance analysis utility reports on average data payload or ACK/NAK ratio.

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SBAE30B USB 2.0 Protocol Analyzer System (SBAE30B-2X-ADC)

Dual-ported protocol analysis for USB low-speed, full-speed, and high-speed. Includes performance analysis, OTG analysis, protocol error detection, advanced triggering, Timing Analyzer (T32) and DC Compliance Suite (DCC). See picture. Datasheet. The SBAE30B is field upgradable with a software license key to enable the Exerciser capabilities.

The Exerciser upgrade (SBAE30-EDHSU) adds all the SBAE30B traffic generator features to the base analyzer system:

- Host Exerciser (EH32)
- OTG Exerciser
- Device Emulation (ED32)

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SBAE30B USB 2.0 Protocol Analyser / Exerciser System (SBAE30B-2X-EDH)

The top of the line SBAE30B Protocol Analyzer / Exerciser system offers all of the functionality outlined above including Dual-ported protocol analysis for USB low-speed, full-speed, and high-speed; performance analysis, OTG analysis, protocol error detection, Advanced Triggering, Timing Analyzer (T32) and DC Compliance Suite (DCC), Host Exerciser (EH32), OTG Exerciser and Device Emulation (ED32). **See picture.** **Datasheet.**

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