

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

SBAE-30

Bus & Protocol Analyzers

USB 1.x

USB 2.0



CERTIFIED USB

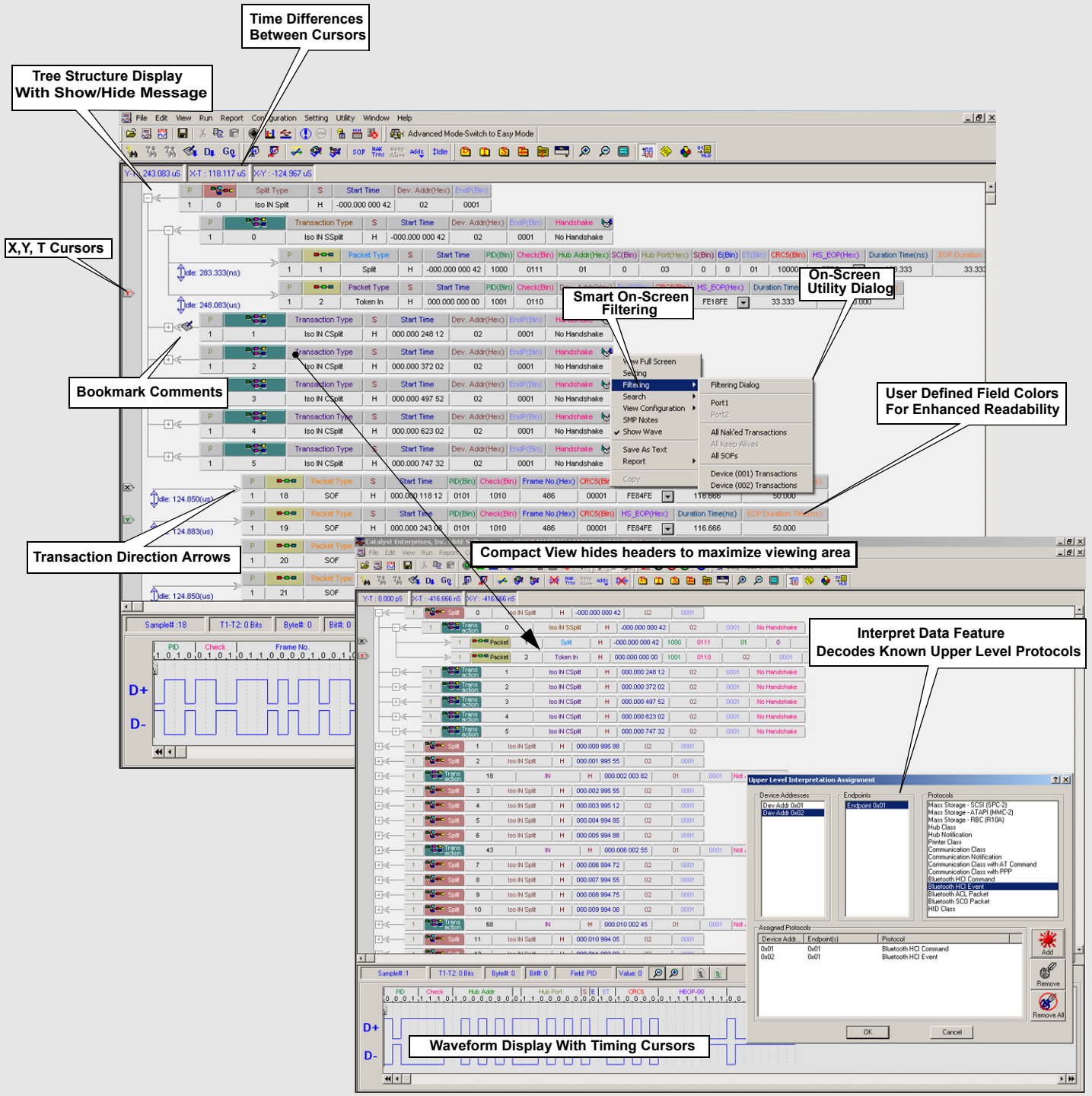
Analyzer/Exerciser
High Speed, Full Speed, and Low speed
USB Host Exerciser
USB Device Emulation
OTG Analyzer/Exerciser
Integrated Timing Analyzer
Upper Level Protocol Decodes
Reduced frequency operation down to 1 KHz
Ultimate Graphical User Interface
Inrush, Suspend, Operating, Unconfigured Current Compliance testing
VBus and VDroop Measurements
Ethernet or USB 2.0 Control Interface
Field upgradable FPGA design
Free lifetime software upgrades
Free Technical Support

CATALYST ENTERPRISES INC.
www.getcatalyst.com
PCI Express, PCI, PCI-X, SAS/SATA
USB

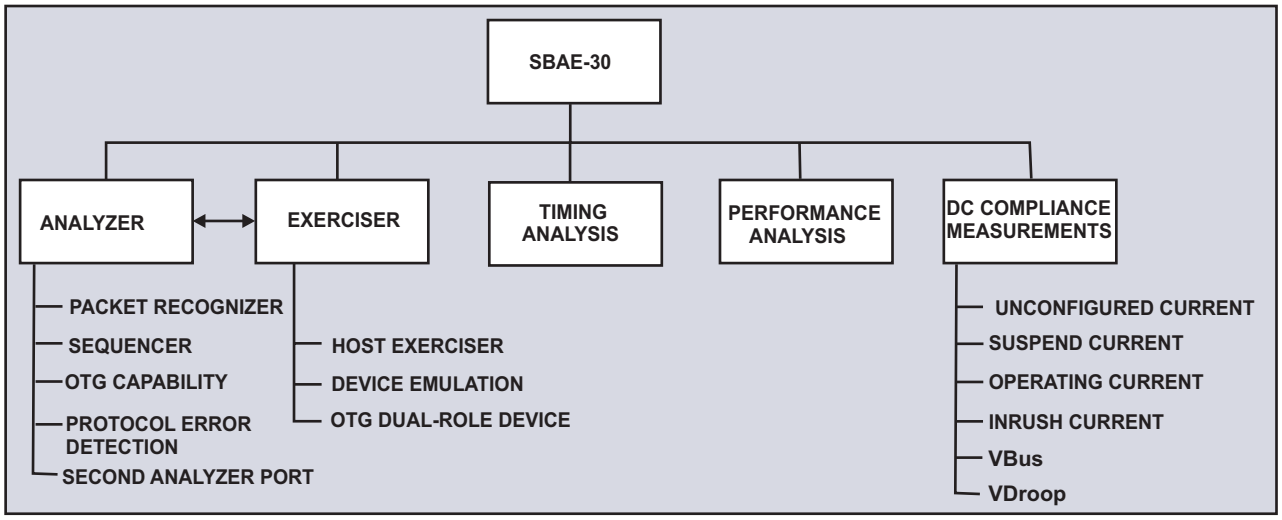
© 2005
031405 P/N 400-0050-004A

SBAE-30B

Ultimate Graphical User Interface



Features



High Performance Analyzer

The SBAE-30B is a USB 2.0 serial bus analyzer capable of analyzing data transfers of up to 480Mb/s. The SBAE-30B detects the bus speed and analyzes the protocol accordingly.

Non-Intrusive

Proprietary high impedance circuitry between the bus and the analyzer prevents any signal distortion when the analyzer is introduced between the host and the device. Not reshaping the signal allows the analyzer to see the data exactly as it appears on the bus.

Real-Time Filtering

Eight user-defined packets, representing all possible USB protocol fields, allow users to precisely define patterns for capture and triggering, up to 1024 bytes long. These packet definitions are then used in a flexible 32-state **Sequencer** that allows users to define a sequence of actions to be performed by the hardware in response to events and packets detected on the USB bus. This allows effective real-time filtering of data by excluding capture of unnecessary data.

OTG Support

The analyzer is capable of capturing and triggering on SRP and HNP. All details of OTG sessions are captured and displayed for thorough analysis of OTG device interaction.

Protocol Error Detection

SBAE-30B detects up to 13 protocol errors in real-time and additional 20 protocol errors by post capture processing.

Second Analyzer Port

The auxiliary connectors allows for a complete characterization of Hub connectivity, or may be used as an independent secondary analyzer channel. All USB speeds are supported by this port.

Interactive Analyzer/Exerciser

The Analyzer may be configured to capture and analyze data while the exerciser generates traffic on the bus. The Exerciser allows exercising as a **Host Exerciser** or a standard USB **Device Emulation**. The SBAE-30B **OTG Exerciser** emulates a Full/High speed OTG Dual-Role device and allows the emulation of an SRP capable peripheral.

Timing Analyzer

The Timing Analyzer offers an extension of the analyzer by providing a complementary precision timing analysis display.

Performance Analysis

Throughput of bus, efficiency of a device, bus usage by a device, data rate, etc. are monitored in real time and performance reported in accordance with user defined performance expressions.

DC Compliance Measurements

The SBAE-30B measures **Inrush** current, **Unconfigured** current, **Operating** current, **Suspend** current and **VBus** based on device compliance requirements. A host VDroop measurement is also provided. Measurement results are displayed graphically and numerically, with a pass/fail report.

Fully Field-Upgradable

A powerful FPGA core design allows easy field upgrades to the latest software releases. Use of an authorization code allows the activation of subsequently-purchased options without requiring a return to the factory for upgrade.

Benefits

- The SBAE-30B is a powerful tool for all phases of USB software, firmware and hardware development
- Intuitive Dual-Mode GUI reduces learning time
- Compliance testing of products
- Silicon prototyping at low frequencies required for emulators
- Benchmarking performance
- Controlled timing and Error injection by Exercisers for extensive device characterization and stress testing
- Versatility
  - - FPGA based hardware automatically upgrades with new features
  - - Field upgradable options
- Compact instrument design
  - - All features in one chassis
  - - No external components required
  - - Integrated universal power supply
- Non restrictive software license allows sharing of captures between team members
- External I/O offers a way to interface with a variety of equipment types
- On-board memory of SBAE-30B lowers system requirements on the PC running the SBAE-30B software

Analysis

SBAE-30B is capable of capturing and triggering data in 2 modes of operation, Easy and Advanced.

Easy mode allows users to use the SBAE-30B for the most common captures immediately with only three setup steps that use predefined, point and click, capture and trigger commands.

Advanced mode is designed to allow users to define custom capture and trigger commands using a flexible GUI based scripting language. A programmable sequencer permits the user to define exactly what data to capture and what to trigger on by defining a series of conditional and unconditional statements.

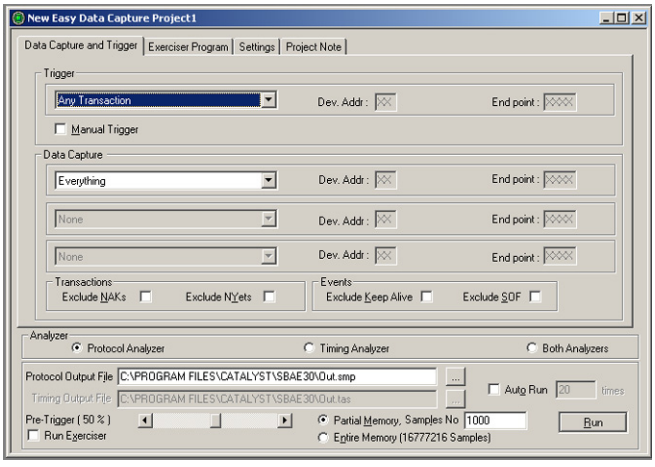
In addition a **Default Capture** feature is provided to allow you an immediate one button click capture of bus activity without any setup whatsoever.

Easy Mode (Pre-Defined)

Data Capture & Trigger

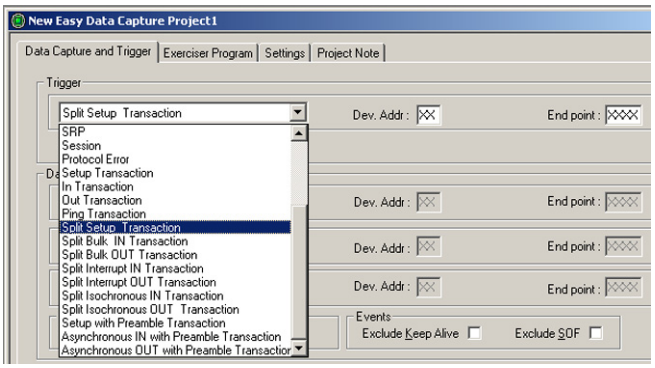
This interface allows hardware or software oriented USB debug without requiring any programming or setting of the analyzer.

A comprehensive selection of predefined setups allow capturing of several predefined data/event types and variety of trigger selections. The data to capture or to trigger on may be further narrowed by a specifying the addresses and the end points.



Pre-Defined Trigger Selections

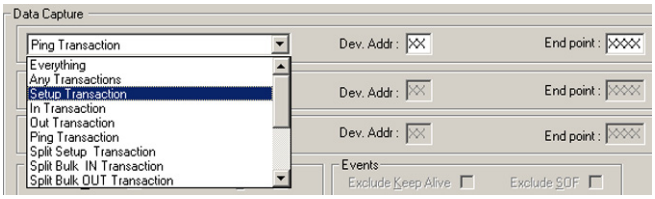
The following are some of the commands available for High/ Full/Low speed trigger selections in the Easy mode.



- Manual trigger - external push button
- Snapshot - trigger immediately
- Trigger on any Transaction
- Trigger on a Data Packet with specific data
- Trigger on Bus Reset
- Trigger on Chirp
- Trigger on Resume
- Trigger on Suspend
- Trigger on HNP [OTG trigger]
- Trigger on SRP [OTG trigger]
- Trigger on Session [OTG trigger]
- Trigger on Protocol Error
- Trigger on Setup Transaction
- Trigger on In Transaction
- Trigger on Out Transaction
- Trigger on Ping Transaction
- Trigger on Setup with Preamble Transaction
- Trigger on Isochronous In Transaction
- Trigger on Isochronous Out Transaction
- Trigger on Setup with Preamble Transaction
- Trigger on Asynchronous In with Preamble Transaction
- Trigger on Asynchronous Out with Preamble Transaction
- Trigger on Split Setup Transaction
- Trigger on Split Bulk In Transaction
- Trigger on Split Bulk Out Transaction
- Trigger on Split Interrupt In Transaction
- Trigger on Split Interrupt Out Transaction
- Trigger on Split Isochronous In Transaction
- Trigger on Split Isochronous Out Transaction
- Trigger on VBus and Operating Current
- Trigger on Data Pattern and Length

Pre-Defined Data Capture Selections

The following are some of the commands available for High/ Full/Low speed data/events capture selections in the Easy mode. Up to three commands may be selected simultaneously.

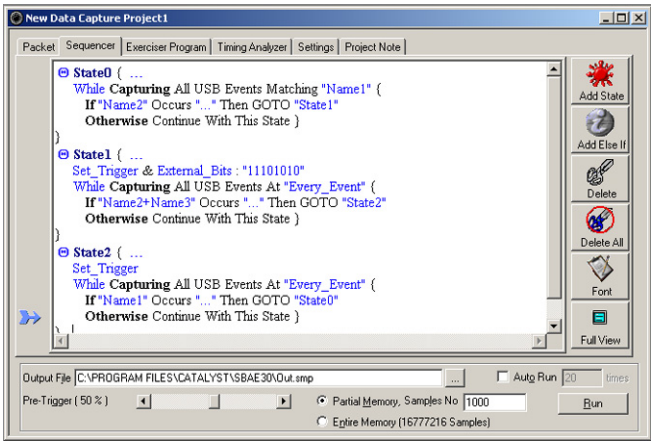


- Capture Everything
- Capture any Transaction
- Capture Setup transaction at specified address and endpoint
- Capture In Transaction at specified address and endpoint
- Capture Out Transaction at specified address and endpoint
- Capture Ping Transaction
- Capture Split Setup Transaction
- Capture Split Bulk In Transaction
- Capture Split Bulk Out Transaction
- Capture Split Interrupt In Transaction
- Capture Split Interrupt Out Transaction
- Capture Split Isochronous In Transaction
- Capture Split Isochronous Out Transaction
- Capture Isochronous In Transaction at specified address and endpoint
- Capture Isochronous Out Transaction at specified address and endpoint
- Capture Setup with Preamble Transaction at specified address and endpoint
- Capture Asynchronous In with Preamble at specified address and endpoint
- Capture Asynchronous Out with Preamble at specified address and endpoint

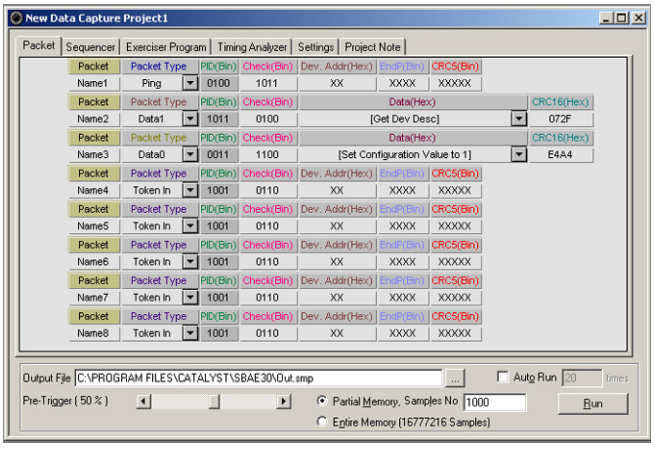
Advanced Mode (User Setup) For Debugging More Complex Problems

This mode is intended for use in applications that are not included as pre-defined setups in the Easy Mode and require more complex analysis. In this mode the user may define packets and events that are then used in the **Sequencer** for each of the available 32 linked states. Up to 8 different packet definitions of all possible packet types are used by a **Packet Recognizer** with pre-defined bus events to create Boolean expressions. These expressions are then used as conditions in the sequencer program for each state to define what is to be captured, tagged and discarded and to cause a transition to other states.

Sequencer Programming Dialog



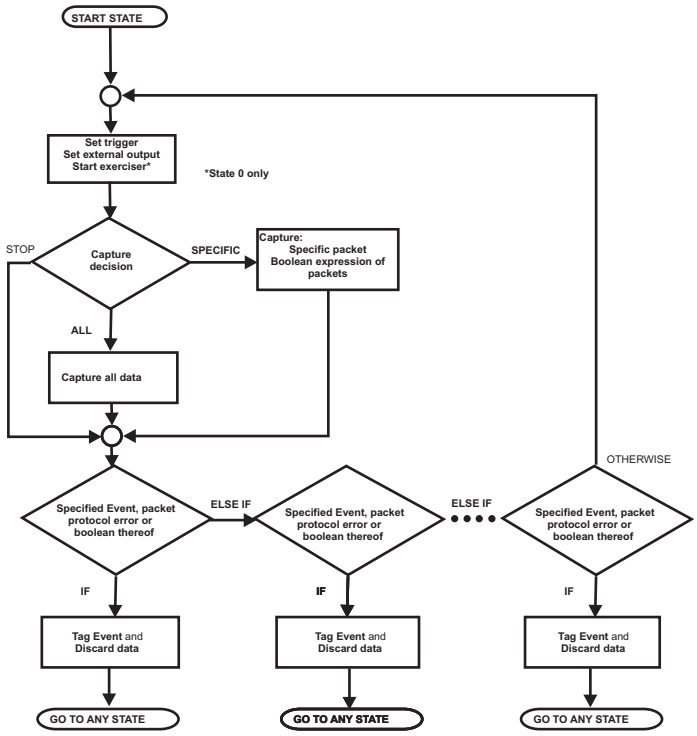
Packet Definition Dialog



Pre-defined Events

- Bus_Idle
- Resume
- Bus_Reset
- Disconnect
- Keep Alive
- Suspend
- Chirp
- Session [OTG]
- SRP [OTG]
- Connect [OTG]
- HNP [OTG]
- Protocol Error

Sequencer Flow



Protocol Errors

The SBAE-30B hardware monitors, detects and can trigger on up to 13 different protocol errors in real time. In addition, the software detects another 20 protocol errors by post-capture processing.

Real-time protocol Errors

Err0 Bit Stuff (Packet corrupted, stuff bit not present)

Err1 PID Err (Packet Identifier check failure)

Err2 PID Unknown (PID not defined by USB)

Err3 Synch Error

Err4 CRC5 Error (IN, OUT, SETUP Packet error)

Err5 CRC16 Error (DATA0, DATA1, DATA 2, MDATA payload error)

Err6 Frame Length (The space between SOF is not per USB specification)

Err7 Babble (Bus not idle at end of frame)

Err8 Data Toggle (Detected incorrect Data packet toggle bit)

Err9 EOP Error (Incorrect width of EOP signal or incorrect EOP occurrence)

Err10 Loss of Activity (Packet transfer followed by constant state on bus)

Err11 Timeout (Distance between token or data packet and corresponding response greater than USB specified)

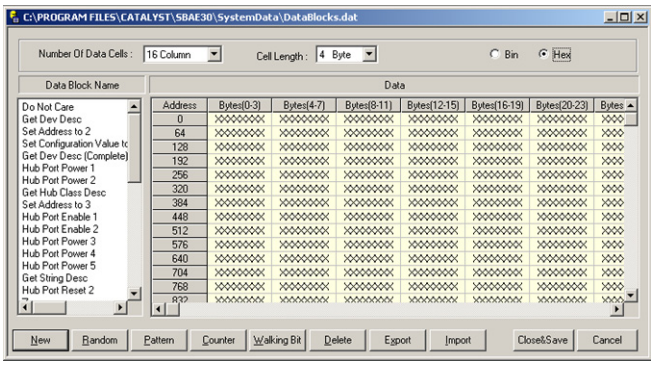
Err12 Bus error indicating that both D+ and D- signals were set to one

Err13 Short Interpacket Delay

DATA BLOCKS

The Data Blocks utility is a convenient GUI based method of creating an unlimited number of large blocks of data. These data blocks then may be included as payload data for packets used in the **Packet Recognizer** or when generating traffic with the optional **Host Exerciser**. Data block types supported are:

- User defined data pattern
- Walking bit data pattern
- Random data pattern
- Counter data pattern

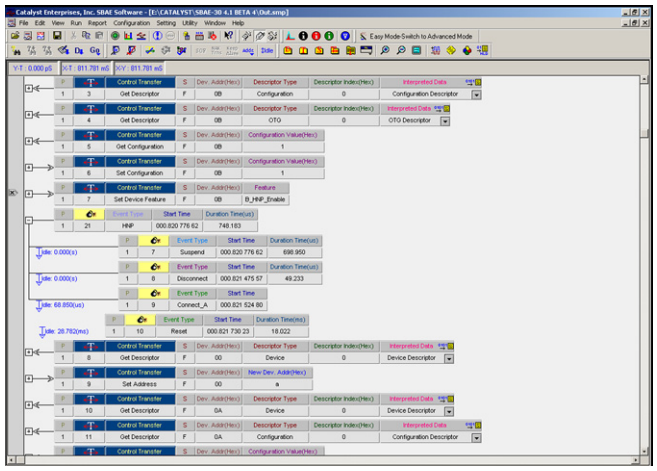


Up to 120KB/per data block may be defined with the data organized in 1, 2, 4, 8, or 16 cells per row, and 1, 2, 4, 8, or 16 bytes per cell.

The data blocks may be edited, imported and exported as text using any common text editor such as Windows Notepad.

Display Capability

The ultimate graphical user interface display offers a significant set of features to assist in analyzing results.

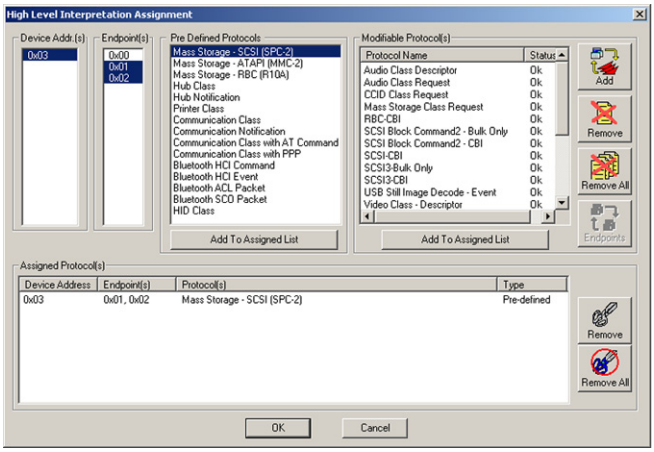


The results window provides for:

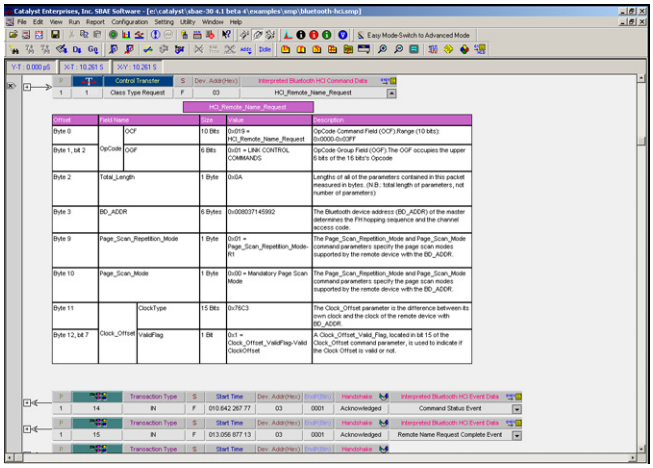
- Display of all captured transactions, packets or bus events
- **Compact View** hides headers for increased viewing area
- Interpret standard USB decodes and Upper Level Protocols
- **Smart On-Screen** filtering and utility access
- Filtering of any packet type in or out
- Hide or unhide the columns fields
- Capability to change the color of the different fields in the viewer
- Display of time difference between the positions of the X, Y, Trigger cursors
- Zoom In and Zoom Out, Full Screen capabilitity
- Wave display of Transactions
- Format of data in Hexadecimal, Binary or ASCII
- Export in text format
- Notes and bookmarks
- Search utility
- Go to X, Y, Trigger cursors, Events, Packets, Transactions, Transfers

Upper Level Protocol Decodes

The Upper Level Protocol Decode utility is a results analysis tool that allows the decode and interpretation of upper level protocols used by a known device in a data capture result.



Protocol data is decoded and displayed in an easy to interpret tabular format.



Upper Level Protocols currently decoded:

- Mass Storage - SCSI (SPC-2)
- Mass Storage - ATAPI (MMC-2)
- Mass Storage - RBC (R10A)
- Hub Class
- Hub Notification
- Printer Class
- Communication Class
- Communication Notification
- Communication Class with AT Command
- Communication Class with PPP
- Bluetooth HCI Command
- Bluetooth HCI Event
- Bluetooth ACL Packet
- Bluetooth SCO Packet
- HID Class
- Audio Class Descriptor
- Audio Class Request
- CCID Class Request
- Firmware - Class Request
- Firmware - Class Descriptor
- Mass Storage Class Request
- RBC CBI
- SCSI Block Command2 - Bulk Only
- SCSI Block Command2 - CBI
- SCSI - CBI
- SCSI3 - Bulk Only
- SCSI3 - CBI
- SSC - Bulk Only
- USB Still Image Decode - Class Request
- USB Still Image Decode - Command
- USB Still Image Decode - Data/Response
- USB Still Image Decode - Event
- Video Class-Descriptor
- Video Class - Event
- Video Class - Payload
- Video Class - Transport
- Video Class - Video Streaming - Class Request
- Video Class - Video Control Interface Class Request
- Video Class - Payload Descriptor
- Video Class - Processing Units - Class Request

Support of future protocol decodes is planned.

User Defined Decodes

An Advanced Script Language (ASL) extension of the Upper Level Protocol decodes allows the user to define custom upper level protocol decodes beyond those provided with the product. With the ASL the user can create custom scripts to extract and interpret arbitrary data from the USB stream. Interpretation includes any class or vendor specific requests and descriptors, protocols and any structured data transferred over the USB. Additionally the ASL allows the user to complement the pre-defined protocols to satisfy more specific custom requirements.

Post Processing Utilities

Search Utilities

The search utility offers you the capability to:

- Search for any bus transaction
- Search for any packet
- Search for any bus condition
- Search in any direction from start, end or X, Y or Trigger cursors in the viewer

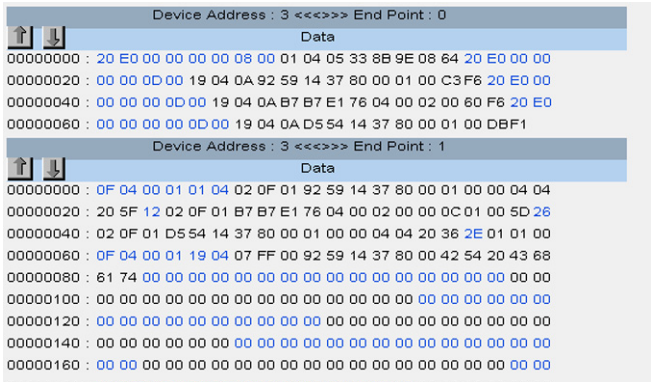
Packet Viewer Filtering

The packet viewer filter may be used to exclude user defined from the display. The filter excludes:

- Specific packets
- Specific transactions
- Specific bus events
- Specific fields

Data Report

Captured data may be displayed as a report of all of the captured data, data for selected devices or just selected lines.



Mnemonics

Up to 8 mnemonics can be defined and assigned to 8 different packets and then saved as a file. An unlimited number of mnemonics files may be defined and saved for recall and use in various applications.

Mnemonics may be used to:

- To locate and indicate certain packets in the viewer by their names
- Search for pre-defined patterns
- Filter the results in the packet viewer

Host Exerciser (Optional)

The SBAE-30B is capable of exercising as a host or a device in 2 modes of operation, Easy and Advanced.

Easy mode is designed to provide point-and-click access to utilities which perform bus exercising and device interrogation applications such as reading the device descriptor with no requirement for programming.

Advanced mode is designed to allow users to set up a series of USB commands in a program to meet their special needs. A copy and paste feature allows the rapid creation of a powerful Host Exerciser program from a captured data file.

Easy Host Exerciser Program

There are many utilities provided to help users easily detect, configure and communicate with a device without requiring any setup.

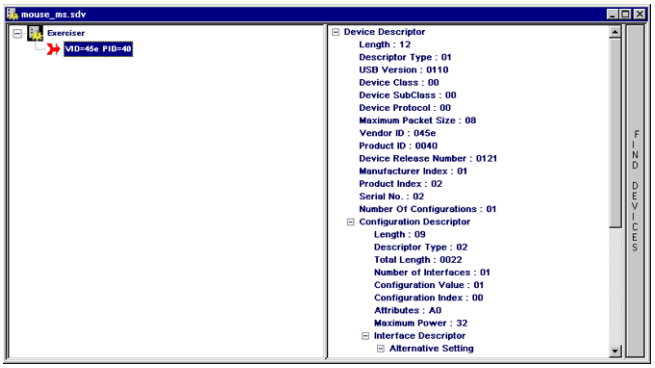
Easy Host Exerciser commands

Pre-defined commands allow immediate exercising of High/ Full/Low speed devices including hubs. The following is a sample of these commands.

- Get Configuration Descriptor
- Get Device Descriptor
- Get Interface
- Get Device Status
- Set Device Address
- Set Configuration

Scan Descriptors

The “View Scan Descriptor” utility displays detailed descriptor information about connected devices enumerating all devices at all speeds in tree form.



Advanced Host Exerciser Program

Proprietary Engine

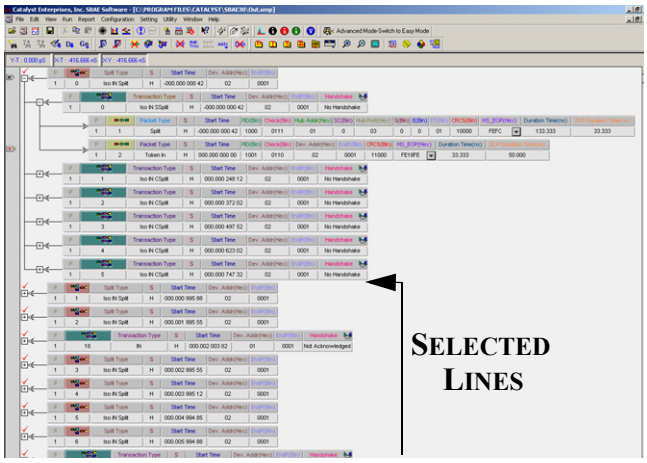
- Generates Bus Reset, Suspend and Resume
- Generates Control and Bulk Transfers
- Generates Complete Split and Ping Transactions
- Generates Complete Asynchronous and Isochronous Transactions (In, Out and Setup)
- Inserts Bus Idle and SOF
- Allows infinite looping or finite loop of program or selected program segment
- Generates user defined bit streams on the USB bus, allowing traffic with error conditions
- All the above operations may be performed on the convenient GUI

Pre-Defined Host Commands

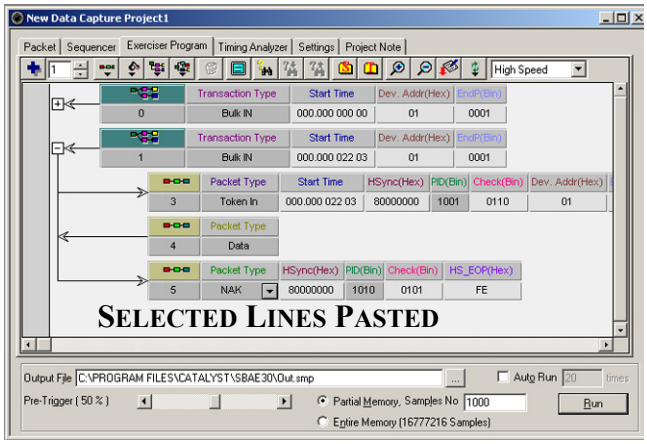
- Start of Frame
- Split Setup Transaction
- Split Bulk In Transaction
- Split Bulk Out Transaction
- Split Iso In Transaction
- Split Iso Out Transaction
- Split Interrupt In Transaction
- Split Interrupt Out Transaction
- Ping Transaction
- Setup
- Isochronous In Transaction
- Asynchronous In Transaction
- Isochronous Out Transaction
- Asynchronous Out Transaction
- Setup with Preamble Transaction
- Asynchronous In with Preamble Transaction
- Asynchronous Out with Preamble Transaction

Exerciser Programming Shortcut

A copy and paste feature allows the user to create an exerciser program from a successful analysis result.



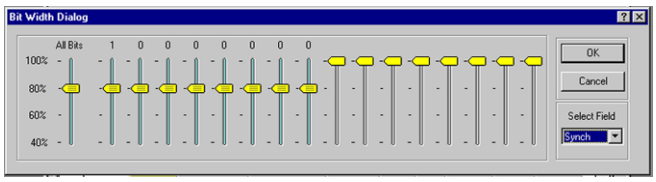
The user simply selects and copies a number of lines from the results display and pastes them into an Exerciser Program window. Only program lines are pasted with non applicable lines such as protocol errors filtered out.



Data may also be imported from a saved capture file.

Adjustable Bit Width (Full/Low speed only)

Adjustable bit width of 40, 60, 80, and 100% allows users to modify the width of the packet fields.

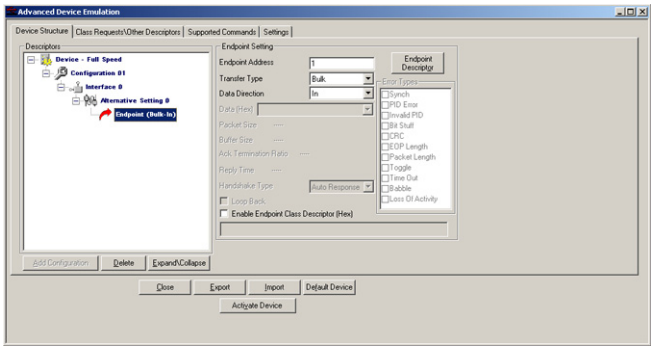


Transaction Retry

All transactions except Iso are selectable for automatic retry in response to data transfer failure. Options are available to specify the number of retries for NAK'd and failed transactions.

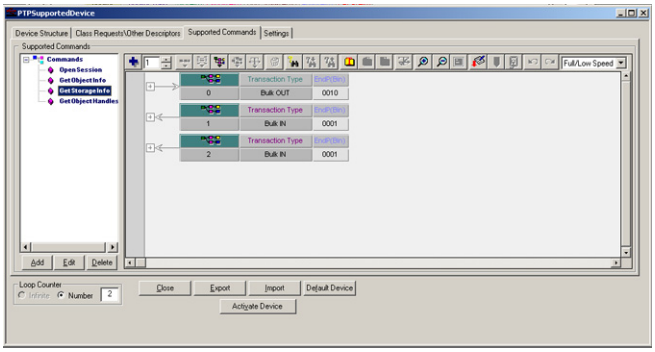
Device Emulation (Optional)

The SBAE-30B Device Emulation simulates standard USB devices or non standard behavior. A convenient GUI displays device hierarchy for easy device configuration.



Main features are:

- Device speed can be selected as Low or Full or High or High/Full
- Can act as a real device or a test device that does not require a configuration value
- Allows two configurations with four interfaces each. Two alternate settings for each interface for a total of non-control seven endpoints and one control endpoint.
- Supports most standard control requests
- Fully customizable Device, Configuration, Interface, Endpoint and String descriptors
- Controlled response on non-control endpoint: ACK, NAK, STALL, NYET, etc.
- Responds to user defined Class specific requests
- 64K buffers for each endpoint, excluding control endpoint with user controlled content



Buffer Content

- Endpoint loopback permits the device to resend host data
- Transfer types (Iso, Interrupt, Bulk and Control) in both directions
- Endpoint descriptors

Injection of Protocol Errors

- Bit stuff error
- CRC error
- EOP length error
- Packet length error
- PID error
- Invalid PID error
- Synch error
- Toggle error
- LOA (Loss of Activity)
- Timeout error
- Babble error

Supported Requests

- Get_Status
- Clear_Feature-Endpoint Stall
- Set_Feature - Endpoint Stall
- Set_Address
- Get_Descriptor
- Get_Configuration
- Get_Interface
- Set_Interface
- Up to 8 user - defined Class requests

Supported Descriptors

- Device Descriptor
- Configuration Descriptors
- Interface Descriptors
- Endpoint Descriptors
- Up to 7 String Descriptors
- Up to 4 user - defined Descriptors

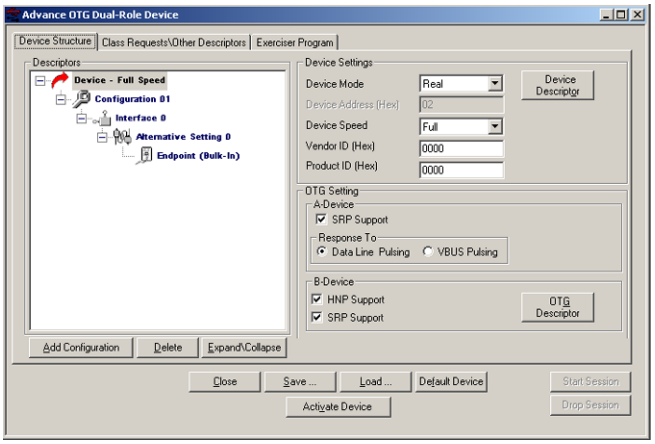
Advanced Mode Capability

The Advanced mode provides all of the Easy Mode capabilities with the additional capability to create up to 31 custom command sets for custom applications.

OTG Exerciser (Optional)

The SBAE-30B OTG Exerciser is a Full/High speed OTG Dual-Role Device that can act as a host or a peripheral. The OTG Exerciser:

- Supports SRP & HNP.
- Supports multiple role switches on the fly.
- Supports any peripheral class.
- Allows error injection for characterization of Device Under Test.
- Works in conjunction with the Analyzer to view OTG Exerciser and Device Under Test interaction.



A convenient GUI allows:

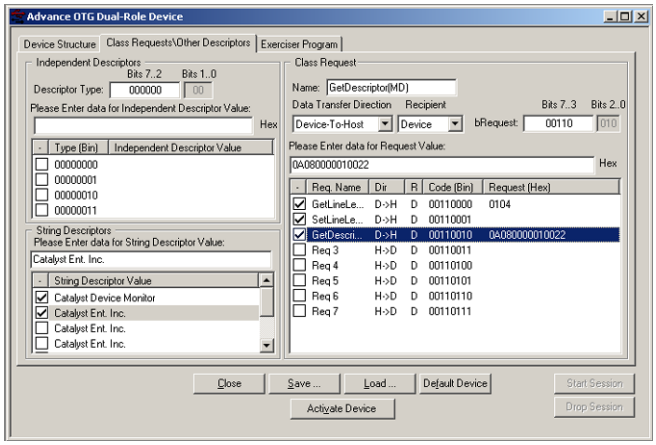
- Individual customizing of parameters for operation as a peripheral and a host.
- User selectable Data Line or VBus SRP pulsing response when operating as an A-Device.
- Enabling/disabling HNP support to emulate an SRP-capable peripheral when operating as a B-Device
- Controlled initiation or requesting of sessions.

OTG Exerciser as a Peripheral

Simple configuration of device by adding or deleting device Configurations, Interfaces, Alternate Settings and Endpoints.

Device features are:

- Definable as a real device or as a test device not requiring a configuration value.
- Allows one configuration with three interfaces or Alternate Settings , three Configurations with one interface or Alternate Setting each or any mix of the above.
- Up to 3 non-control endpoints each with a 64KB buffer with user defined content.
- One control endpoint, fully customizable OTG Device, Configuration, Interface Endpoint and String Descriptors.



Control Endpoint

- Supports most standard requests
  - Get_Status
  - Clear_Feature - Endpoint Stall
  - Set_Feature - Endpoint Stall
  - Set_Address
  - Get_Descriptor
  - Get_Configuration
  - Set_Configuration
  - Get_Interface
  - Set_Interface
- Up to 8 user-defined Class or Vendor-specific requests
- Supported Descriptors
  - Device
  - Configuration
  - Interface
  - Endpoint
  - Up to 7 String Descriptors
  - Up to 4 user-defined Descriptors

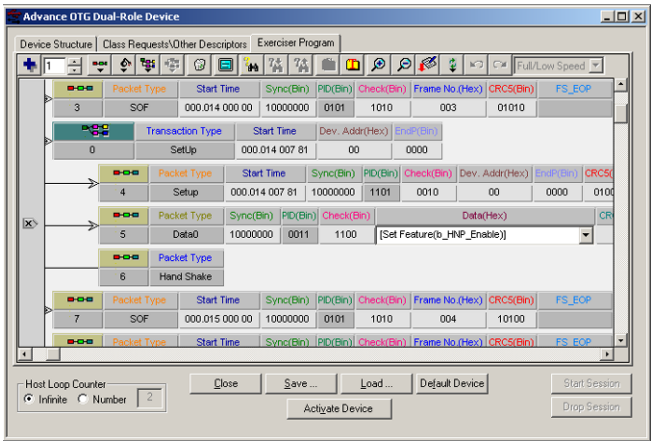
Non-Control Endpoints

- Three with user assigned Endpoint Number and direction.
- Support Isochronous, Interrupt, or Bulk transfer types
- Up to 64KB buffer with user-defined data
- Configurable Data packets size
- One Endpoint loopback permits device to resend data acquired from the host.
- Selectable handshake response: Auto with ACK/NACK termination ratio, ACK, NACK, No Handshake, Stall, NYet (High Speed Only), Err (High Speed Only)

- Error Injection
  - Bit Stuff (not available in High Speed)
  - CRC
  - EOP Length
  - Packet Length
  - Check Field
  - Invalid PID
  - Synch (not available in High Speed)
  - Toggle
  - Loss Of Activity (not available in High Speed)
  - Timeout
  - Babble

OTG Exerciser as Host

When operating as a Host the user creates a traffic sequence by adding a set of transactions on a convenient GUI. All aspects of generated data are under user control. An import feature allows the user to copy traffic captured by the Analyzer and to paste it into the Exerciser Program.



Key features are:

- Complete traffic definition including Bus Reset, arbitrary requests to control endpoint, Bulk transfers and more.
- Multiple role switch with HNP command.
- Enables setting of b_hnp_support, a_hnp_support and a_alt_hnp_support features.
- Extensive set of pre-defined commands with infinite or finite looping of selected traffic.
- Error Injection such as Synch, EOP, Check field, CRC, Delay between transactions.

External Signals

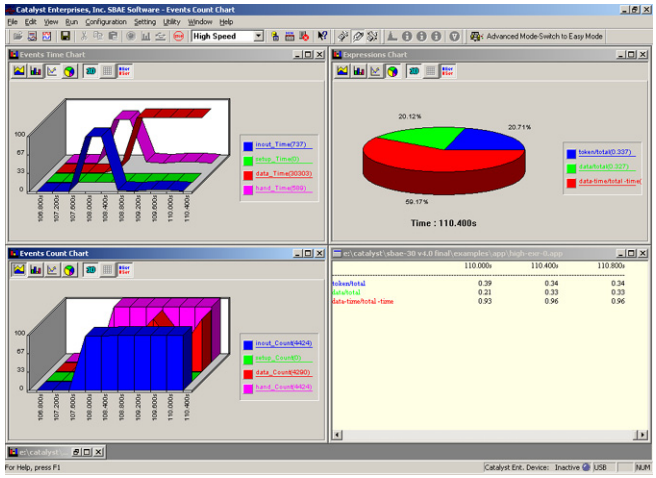
- 8 external signals are used for digital pattern generation or controlling other peripherals. At each state of the sequencer user may define a unique pattern to be outputted
- External trigger input may be set to rising, falling, high or low levels for triggering the SBAE-30B from another source
- Lower external clock rates may be applied for specialized testing, other than the standard 1.5MHz and 12MHz. Supported frequencies are in ranges of 400KHz - 8MHz for High Speed and 1KHz-100KHz, 400KHz - 8MHz for Full/Low speed.

Continuous Real Time Performance Analysis

The SBAE-30B real time Performance Analyzer uses dual port FIFOs to interface between the Counters/Timer and the host system. This allows true real time measurements and provides the users with a complete and accurate event count and time measurement up to 480Mb/s.

- Four 24 bit Event Counters for packets or events defined by the user
- Four 30 bit Event Timer for packets or events defined by the user
- Users may use the provided setups to measure the most typical parameters or design up to 32 custom expressions for their specific requirements
- Report interval selectable from 500 microseconds to 10 minutes
- Eight color display
- Record the analysis in graphical format for later review or demonstration without requiring the hardware

Performance Analysis can work simultaneously with the exerciser to generate traffic and measure the target performance.The results display allows a variety of user selectable display formats.)



Timing Analysis (Optional)

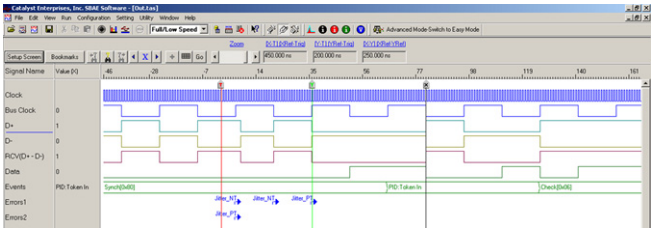
The SBAE-30B offers precision timing analysis by sampling bus signals at sampling rates appropriate for each bus speed selected.

Timing analysis when enabled in the Easy Mode performs a timing analysis whenever the analyzer is triggered as specified.

A more specific Timing analysis may be performed in the Advanced mode where the timing analysis may be programmed to trigger on specific bus events in the sequencer or on specific bus line states.

Timing Analysis Result Display

The timing analysis results display is a waveform view that displays and interprets the bus state and identifies low level signalling errors.



Detected Errors

- Invalid EOP
- False EOP
- Bit Width
- Bit Stuff
- Bad Synch
- Jitter on next transition
- Jitter on paired transition
- Interpacket delay
- End to End
- Skew

DC Compliance Measurement (Optional)

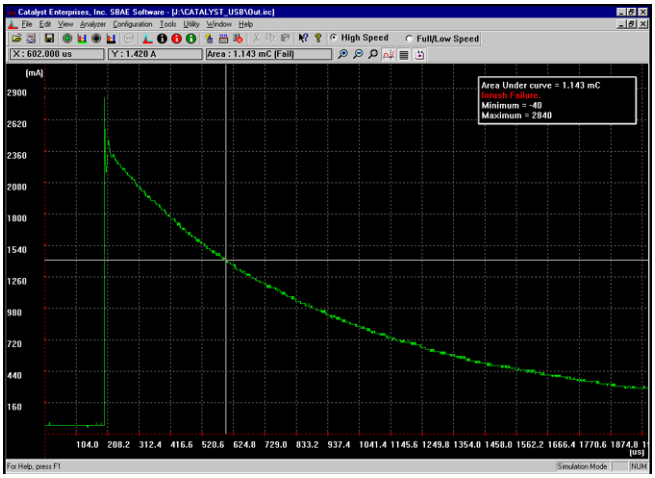
The SBAE-30B incorporates Inrush, Suspend, Unconfigured and Operating current measurement as well as VBus voltage measurement. A host VDroop measurement is also provided. The current of the device is measured, calculated and displayed against Pass or Fail limit according to USB-IF workshop procedures.

Inrush Current

The Inrush current measurement circuit automatically discharges the device for each measurement to assure that repeatable and accurate measurements are performed according to the specifications. Power is provided to the device from within the SBAE-30B to eliminate the unknown from the external source and to eliminate the inductance due to the length of cable being used.

The Inrush current is measured with resolution of 19.6mA for current up to 5A peak or resolution of 39.2mA for current up to 10A peak with a 5MHz sampling frequency.

The measured Inrush current is digitized, stored and the energy calculated for the area under the curve and displayed for the first 10 milliseconds of a device attachment. The Pass/Fail is reported based on the USB-IF specifications.



The inrush current viewer allows:

- Zoom In and Zoom Out
- Best Fit of the curve in the display window
- Cursor movement on the curve with display value
- X and Y display scaling

Operating & Unconfigured Current

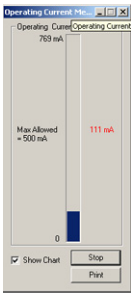
Configured and Unconfigured current are measured with a resolution of 1.5mA up to 769mA. The measured value and pass limit is displayed in real-time. Additionally the Protocol Analyzer may be triggered on the results of the operating current measurement whenever the current remains at a specific value for at least 0.2µsec with a tolerance of ± 1.5 mA .

SUSPEND CURRENT

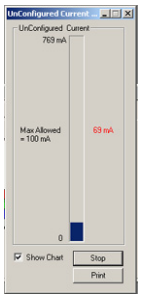
The suspend current is measured with a resolution of 1.2uA up to 2500uA.

The Pass/Fail result is displayed and compared to the acceptable limit.

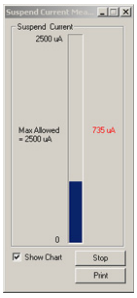
Operating Current

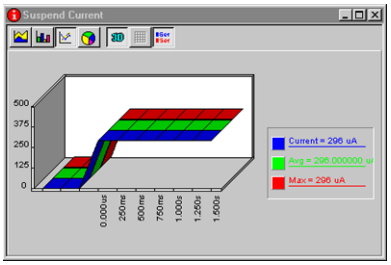


Unconfigured Current



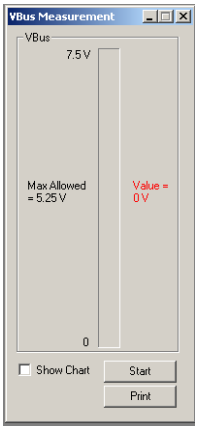
Suspend Current





Operating, Unconfigured and Suspend current measurements may also be displayed as a function of time in a chart display.

VBUS MEASUREMENT



The VBus measurement is made at a resolution of 7.3mV with the result displayed graphically together with pass criteria.

Additionally the Protocol Analyzer may be triggered by the result of the VBus measurement. To trigger, the level has to remain at the specified value for 2µsec with a tolerance of ±10mV

SBAE-30B Specifications

Analyzer

General

Bus Type	USB 1.x and USB 2.0 High, Full, and Low Speed
Maximum Transfer rate	480Mb/s
Analyzer Ports	2 Channels
Analyzer memory depth Chan. 1	384MB
Analyzer memory depth Chan. 2	1MB Ch. 1 + 1MB Ch. 2
Triggering	Real time hardware based in Sequencer program, Manual push button Trigger or External Trigger input

Packet Recognizer

Packet Recognizer	8 packet events maximum
Depth of packet events	1024 bytes maximum
Pre-defined packet events	All PIDs defined by USB 2.0

Sequencer

Sequencer Expressions	Using boolean operators (AND, OR, NOT) with 8 packet events, 11 bus events, and 13 Protocol Errors
Sequencer States	32 States, with Actions, Commands, Conditional Actions, and Conditional Jumps defined for each State
State Actions	Trigger, start Host Exerciser (State0 only), or output External I/O bit pattern
State Commands	Capture All, None, or Sequencer Expression
State Conditional Statements	10 per State in a form of If and Else If satisfying a Sequencer Expression, with Conditional Actions and Conditional Jumps per Conditional Statement
State Conditional Actions	Tag event for discard, or Discard tagged Events
State Conditional Jumps	To any State

Time-Tag

Width	40 bits for every eight bits of bus traffic
Recording Resolution	16.67ns (60MHz)
Recording Duration	Approx. 5 hours
Time Display	Event start time relative to Trigger point, duration times of packets/events, EOPs, and idle between packets/events in seconds or bits

Host Exerciser

Bus Type	USB 1.x and USB 2.0 High, Full, and Low Speed
Host Exerciser Memory	1MB (512KB†) physical dedicated to Host Exerciser, unlimited virtual with infinite looping
Program Loops Selection	All or selected segments
Program Loops Count	Infinite looping or 2 - 255 iterations
Packet Generation	All PIDs defined by USB and user defined
Event Generation	Reset, Chirp, Suspend, and Resume
User configurable event settings	All packet fields, start times, enable/disable bit-stuffing, enable/disable EOP, adjustable bit width
Adjustable Bit Width	40, 60, 80, 100% of Full/ Low speed packets

Device Emulation/OTG Dual Role Device

Bus Type	USB 1.x and USB 2.0 High, Full, and Low speed. No Low Speed for OTG
Device Emulation Memory	512KB

External I/O

External Clock Range[1]	Analyzer and Host Exerciser 400KHz - 8MHz for High Speed and 1KHz-100KHz, 400KHz - 8MHz for Full/ Low speed.
External Trigger Input	1 input configured to trigger analyzer on rising or falling edge, or high or low levels
External Outputs	8 bit pattern set at each Sequencer State

Performance Analyzer

Host CPU interface	Real-time FIFOs
Event Counters	Four 24 bit counters assigned to packet events, bus events, protocol error, or boolean OR of them
Event Timers	Four 30 bit counters assigned to Packet events, bus events, protocol error, or boolean OR of them
Performance Analyzer Expressions	32 maximum, using arithmetic operators (add,

	subtract, multiply, divide) on Event Counters, Event Timers, and Time Interval
Time Interval	500us to 10min
Display Modes	Color 2D and 3D charts, and text report
Chart Modes	Columns, Bar, Line, Area, and Pie
Display Scale	Relative (adjust to largest value), Logarithmic (based on natural log of Counter and Timer values), Manual Absolute (user settable value), Auto Absolute (adjust to largest per 100 Time Intervals)

Timing Analyzer

Bus Type	USB 1.x and USB 2.0 High, Full, and Low Speed
Timing Analyzer Memory	1MB
High Speed Sampling[1]	2.91ms max. at 1.44GHz
Full Speed Sampling	11.65ms max. at 180MHz
Low Speed Sampling	93.21ms max. at 22.5MHz
Trigger	Hardware based, on Analyzer trigger, or on trigger of data line patterns

DC Measurements

Inrush Current

Inrush Memory	1MB
Sampling Frequency	Sampled for 10ms at 5MHz
Sampling Resolution	5A max peak at 19.6mA resolution or 10A max peak at 39.2mA resolution

Operating/Unconfigured

Sampling Frequency	Continuous sampling at 250ms intervals
Sampling Resolution[1]	1.5mA, 769mA maximum

Suspend Current

Sampling Frequency	Continuous sampling at 250ms intervals
Sampling Resolution[1]	1.2uA, 2500uA maximum.

VBus Voltage

Sampling Frequency	Continuous sampling at 250ms intervals
Sampling Resolution[1]	7.3mV, 7.5V maximum

Physical

Front Connections

Inrush/Suspend Measurements	USB type Std-A
Main Analyzer	USB type Std-A and Std-B
External Outputs and Trigger Input	Keyed 16-Pin
OTG Exerciser	USB type Mini-AB
Device Emulation	USB type Std-B
Host Exerciser	USB type Std-A
External Clock Input	SMB type
Secondary Analyzer	USB type Std-A and Std-B

Status LEDs

Power, Triggered

Buttons

Manual Trigger Push button

Rear Connections

AC Power	Standard 3-prong
USB Host Interface	USB type (Mini-B†)
Ethernet Host Interface	Ethernet RJ45 connector
	(Custom SCSI-II†

Power Supply

AC Power	(100-120V)/(200-240V) AC, 47-63Hz
Power Consumption	30W typical

Physical Characteristics

Dimensions	8.75”(22.2 cm) W x 2.9”(7.4 cm) H x 10.8”(27.5 cm) D
Weight	3Lbs(1.4Kg)
Operating Temperature	32 - 95°F(0 - 35°C)

System Requirements

Processor	Intel Pentium III 500MHz, or equivalent
Memory	128MB
Display	1024x768 resolution, 16 bit color
Operating System	Windows 2000, Windows XP
Hard Drive	100MB space on partition with SBAE software, 10MB space on Windows partition.

Note: Specifications subject to change without notice.

[1]The SBAE-30B supersedes SBAE-30A and is identified by serial numbers above **SBAE-TBD**. The following specifications apply to SBAE-30B units only:

High Speed Timing Analyzer	Not available
Operating/Unconfigured Current Resolution	3mA
Suspend Current Resolution	9.8uA
VBus Voltage Resolution	29.4mV
External Clock Range	Please contact Catalyst Enterprises for further information.

† SBAE-30 and SBAE-30A only.

Catalyst Enterprises, Inc.
60 Las Colinas Lane
San Jose, CA 95119
Phone (1) 408.365.3846
Fax (1) 408.365.3847
www.getcatalyst.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP