

CATC USB Tracer/Trainer



USB Bus & Protocol Analyzer System

CATC's USBTracer/Trainer is the most accurate and reliable bus and protocol analyzer available in the market. It helps the user to quickly and efficiently debug, test and verify USB semiconductors, devices and systems. It is CATC's fifth generation USB development tool, leveraging over a decade of knowledge and experience in digital communication protocol analysis.

USB Tracer/Trainer provides users with a Hi-Speed USB host interface, which speeds upload transfers by as much as 40x, allowing for quicker access to captured traces. It also provides complete Native OTG (On-The-Go) support that automatically detects, decodes and displays HNP (host negotiation protocol) and SRP (session request protocol). More importantly, SRP occurrences such as VBus and Data Line pulses are captured, displayed and integrated in the trace file; this synchronized view of the OTG protocol provides users with a complete, end-to-end look at OTG occurrences in the Bus.

Like other CATC tools, USB Tracer/Trainer boasts a high-impedance, non-intrusive probe that acts strictly as a "sniffer" and without causing signal re-timing or amplification, thus assuring users of uncompromised data integrity.



USB Tracer/Trainer also employs an Intelliframe mode in traffic generation. It actively searches for a response from the device under test and issues the next appropriate packets, thus enabling "intelligent" framing.

USB Tracer/Trainer provides multiple mechanisms to measure and report on USB traffic. The CATC Trace's Traffic Summary function reports throughput, timing, error rates and other statistical data on any traces. Users can evaluate statistical reports at a glance or navigate to individual fields. A user may select Tokens, Data or Handshake at the Packet level, Handshakes at the Transaction level and Control at the Transfer level. Error searches are also included in the summary report.

For complete product information, please visit www.catc.com.

FEATURES	BENEFITS
• CATC Trace Expert Software System	Faster interpretation and debug of USB traffic.
• Non-intrusive High Impedance Probe	Ensures non-corrupted and uninterrupted data
• Hi-Speed USB Host Interface	Faster Upload of Trace files to the host PC by up to 40x
• Universal Protocol Analysis System (UPAS) 2500H Chassis	Modular design allows for expandability with other CATC-supported technologies while using the same chassis
• Real-Time Statistics	View bus traffic as it occurs even if a Trace is not being recorded
• OTG (On-The-Go) Support	Record and analyze HNP & SRP, including the capture of VBus and Data line pulses
• Trace Navigator	Define areas of interest and focus viewable Trace to areas of most importance
• Advanced Triggering	Easily isolate important traffic, specific errors or data patterns
• Hardware Filtering	Faster analysis by removing non essential fields from the trace
• Intelligent Reporting	Quickly identify and track error rates, abnormal bus or timing conditions
• Sophisticated Viewing	View Packet, Transaction and Transfer layers of the USB protocol
• Dual Recording Channels	Simultaneously record all USB speeds on each of the two channels

THE CATC TRACE

Featuring the CATC Trace expert software system, *USB Tracer/Trainer* uses the de-facto standard for documenting USB protocol. The CATC Trace simplifies the overall debug process by using collapsible, color-coded schemes to represent the USB Packet, Transfer and Transaction layers. Sequences are shown on separate rows with every field labeled and color-coded. Errors are identified and highlighted in red.

For more efficient and deeper analysis, users can view Block Transfers at each layer, view raw data bits and real-time bus utilization. The CATC Trace also supports vendor specific and user-defined decoding to ease USB development for developers looking to implement proprietary commands.

The screenshot displays the CATC USB Tracer software interface. It shows a list of packets and transactions with various fields such as Packet ID, Chirp, Time, and Transaction details. The interface is color-coded to distinguish between different types of data and errors.

Packet	Chirp	Time	Time Stamp
7723	Chirp K	42.650 µs	00003.6222.6499
7724	Chirp J	41.033 µs	00003.6223.1657

Transaction	SETUP	ADDR	ENDP	T	P	R	bRequest	wValue	wIndex	wLength	ACK	
1296	0xB4	0	0	0	H->D	S	D	SET_ADDRESS	New address 2	0x0000	0	0x4B

SPECIFICATIONS

Package

Dimensions:	UPAS: 12.2 x 12.2 x 3.5 inches (31.1 x 31.1 x 8.9cm) USB <i>Tracer</i> & USB <i>Trainer</i> Plug-ins: 4.5 x 6.7 x 1.3 inches (each) (11.3 x 17.0 x 3.2 cm)
Connectors:	UPAS: AC power connection External Trigger connection: (TRIG IN/OUT, BNC) Host connection: (USB, type "B") USB connection: (USB, type "A") USB <i>Tracer</i> Plug-in: Dual Recording Channels (USB, types "A" and "B") USB <i>Trainer</i> Plug-in: Dual Generating Channels (USB, type "A")
Weight	UPAS: 7.5 lb. (3.4 kg) USB <i>Tracer</i> Plug-in: 1.0 lb. (0.5 kg) USB <i>Trainer</i> Plug-in: 1.0 lb. (0.5 kg)

Power Requirements

90-254 VAC, 47-63 Hz (universal input), 100W maximum

Environmental Conditions

Operating Range:	0 to 55° C (32 to 131° F)
Storage Range:	-20 to 80° C (-4 to 176° F)
Humidity	10 to 90% non-condensing

Probing Characteristics

USB *Tracer* Connection

USB "A" and "B" receptacles
Standard cables

USB *Trainer* Connection

USB "A" receptacles
Standard cables

Generating Memory Size

USB *Tracer* 512 Mbytes for trace capturing, timing and control information

USB *Trainer* 256 Mbytes for trace traffic pattern buffering

Host PC Software Requirements

Works with any PC equipped with a functioning USB port and running Microsoft Windows 98/98SE, Windows 2000, Windows Me and Windows XP

Basic Trigger Events -

Packet Identifiers: OUT, IN, SOF, DATA0, DATA1, DATA2, MDATA, ACK, NAK, STALL, NYET, PRE, SPLIT, PING, 0xFF, 0xC1

Token Patterns: Any PID, Address, Endpoint

Frame Patterns: All SOF Frames or Frame Number (0-7FF)

Device Request: Two optional requests for Pattern Definition (Hex, msb -> lsb, MSB -> LSB)

Data Pattern: Hex, msb -> lsb, MSB -> LSB

Bus Conditions: Classic Speed Branches Only (USB Reset, SE0, Suspend, Resume) High Speed Branches Only (Host Chirp, Full Speed J, Full Speed K)

Errors: Bit Stuff, Frame Length, CRC, PID, EOP, Short Byte, Time-out or Turnaround Violation, Excessive Empty Frame Detection, Babble Start Violation, Babble End Violation, Bad Data Toggle

Breakout Board/ Panel BNC: Breakout Board Input 0, 1 (Trigger in 0, 1), Rear Connector (Input 2m Ext. 1 or Ext 2)

Transactions: Selectable up to 3 options, Token PID, Address, Endpoint, Handshake

Data Length: Equal To, Not Equal To, Less Than, Greater Than (Range: 0-2047 Bytes, decimal)

Splits: Split type, Endpoint type, Hub & Port Addresses, Speed option

Reporting and Statistics

Packet Level: OUT, IN, SOF, DATA0, DATA1, DATA2, MDATA, ACK, NAK, STALL, NYET, PRE, SPLIT, PING, Reset, Suspend, Resume, Keep Alive, Chirp

Transaction Level: Handshake, Address, Endpoint, OUT, IN, SETUP, PING, S SPLIT, C SPLIT

Transfer Level: Address, Endpoint, Control, Isochronous, Bulk, Interrupt, Standard, Class, Vendor

Error Reports: Bad PID, Bad CRC5, Bad CRC16, Bad Packet Length, Bad Stuff Bits, Bad EOP, Babble Start, Babble End (LOA), Bad Frame Length, Bad Turnaround/ Timeout, Bad Data Toggle, Bad Frame/uFrame Number, Analyzer Internal Error, Last Byte Incomplete, Bad OTG Signal Value

Computer Access Technology Corporation (CATC) is a leading provider of advanced verification systems and connectivity solutions for digital communications protocols, including Bluetooth, Ethernet, Fibre Channel, IEEE 1394, InfiniBand, PCI Express, SCSI, Serial ATA and USB.



2403 Walsh Avenue
Santa Clara, CA 95051-1302
Tel: +1/ 800 909-2282 (US/Canada)
+1/ 408 727-6600 (Worldwide)
Fax: +1/ 408 727-6622
Email: sales@catc.com
www.catc.com

CATC reserves the right to revise these specifications without notice or penalty.
CATC, CATC Trace, Universal Protocol Analyzer System, UPAS and USBTracer/Trainer are trademarks of Computer Access Technology. All other trademarks are the property of their respective companies.
Copyright © 2003, Computer Access Technology Corporation; All Rights Reserved.
Inventory code : #123-02-1k/March 2003