![tmg Green is life logo]

Green is life
tmg

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Test & Measurement

- sales
- rentals
- calibration
- repair
- disposal

Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

If you click on the "Click-to-Call" logo below, you can all us for FREE!

TMG Corporate Website   TMG Products Website

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Disposal

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Level 3
Repair

Repair

Review & Renew

Level 2
Calibration

Calibration

Recycled

Level 1
Acquisition

Acquisition

Purchase
Lease
Rent

Solution Centre
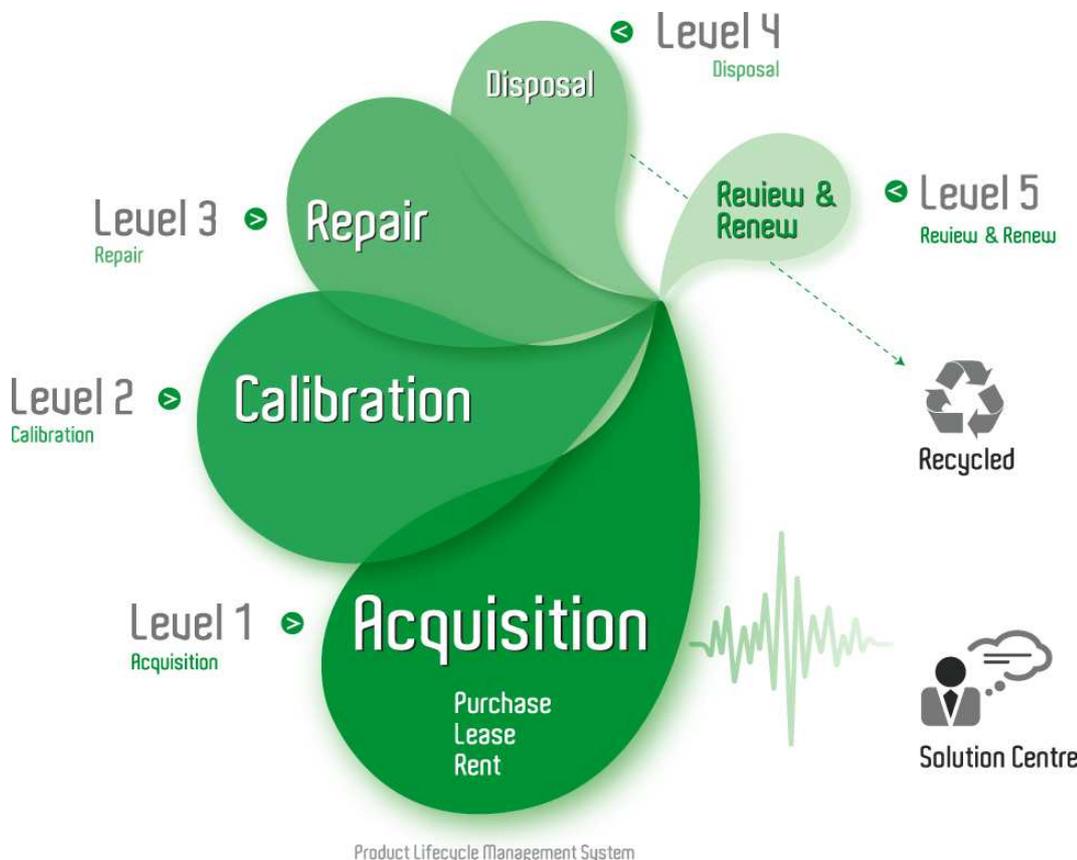
Product Lifecycle Management System

NATA
CERTIFIED MANAGEMENT SYSTEM
AIDN

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UNIVERSAL SERIAL BUS PROTOCOL SOLUTIONS FOR TESTING AND VERIFICATION

USB *Tracer/Trainer*™ System
USB *Mobile*™ HS Analyzer
USB Advisor™ Analyzer
USB Chief™ Analyzer

SI CDB	INQUIRY	Time Stamp
		00008.0086 3429

	ACK	Time Stamp
bytes	0x4B	00008.0086 3429

OUT	ADDR	ENDP	CRC5	EOP	Idle	Time St
0x87	4	1	0x19	250.000 ns	166.660 ns	00008.008

	DATA0	Data	CRC16	EOP	Idle	Time S
00001	0xC3	31 bytes	0xD7A3	250.000 ns	533.330 ns	00008.00

Sync	ACK	EOP	Time	Time Stamp
00000001	0x4B	233.330 ns	1.023 ms	00008.0086 5061

ADDR	ENDP	Mass	INQUIRY	Dev Typ	Rem	Vendor Id	Product Id	Product Rev
4	1	Storage	Response	0x00	1	M-Sys	DiskOnKey	2.01

IN	ADDR	ENDP	T	Data	ACK	Time Stamp
0x96	4	1	0 36 bytes		0x4B	00008.0094 6420

cket	Dir	F	Sync	IN	ADDR	ENDP	CRC5	EOP	Idle	Time St
394	-->	S	00000001	0x96	4	1	0x19	233.330 ns	366.650 ns	00008.009

Packet	Dir	F	Sync	DATA0	Data	CRC16	EOP	Idle	Time S
395	<--	S	00000001	0xC3	36 bytes	0x960C	233.330 ns	500.000 ns	00008.00

Packet	Dir	F	Sync	ACK	EOP	Time	Time Stamp
396	-->	S	00000001	0x4B	250.000 ns	487.133 μs	00008.0095 0760

mary

Go ➡ 0 ⬍ of ### - Packet ###

All reports

- **Pkt** Packets
  - ⓘ Token
  - 01/10 Data
  - 👆 Handshake
- **Trs** Transactions
  - 👆 Handshake
- **Xfr** Transfers
  - ✔ Control
  - ⓘ Errors

Type	Total
OUT	262
IN	2285
SOF	53282
SETUP	15
DATA0	1216
DATA1	1273
DATA2	0
MDATA	0
ACK	2444
NAK	118
STALL	0

LeCroy®, a worldwide leader in serial data test solutions, creates advanced instruments that drive product innovation by quickly measuring, analyzing and verifying complex electronic signals. With systems available for protocol layer testing, LeCroy offers a complete solution to meet the unique demands of Universal Serial Bus (USB) technology. Our solutions have been used by the industry for over a decade, and have been accepted as the standard for USB development and testing.

Diverse Systems for USB

LeCroy offers the widest range of USB protocol analyzers and exercisers in the industry. Our low cost and modular solutions are available for use with USB 2.0, 1.1, and On-the-Go (OTG) standards. Each system has a non-intrusive design that preserves the real world timing conditions by monitoring the links without affecting signal timing, thus assuring you uncompromised data integrity. For more unique developments, you can create your own custom class decodes to further extend the capabilities of the system.

USB All Speed *Tracer/Trainer* System

The USB *Tracer/Trainer* system is built with the CATC™ Protocol Analyzer System 2500H as its foundation for stable and reliable measurements. The industry leading 512 Mbyte of memory and advanced filtering are more than adequate for even the most complex

traffic recordings. With interchangeable plug-ins and field upgradeable firmware, the USB *Tracer* analyzer provides both USB 2.0 and OTG support. The OTG support automatically displays host negotiation protocol (HNP) and session request protocol (SRP), and captures Vbus and Data Line pulses allowing for a complete end to end look at OTG occurrences on the bus.

The USB *Trainer* exerciser is available as a plug-in module, and has both host and device emulation capabilities. It employs an Intelliframe mode that actively searches for a response from the device under test, and issues the next appropriate packet. As a complete solution, the USB *Tracer/Trainer* system gives you the unique ability to record

live traffic and then playback the exact data stream using the *Trainer* exerciser. This saves time in setting up the *Trainer* operations and provides an easy way to recreate problems reported in the field.

USB Classic *Tracer/Trainer* System

The USB Classic *Tracer/Trainer* system has all the features of the All Speed model, except that it only supports USB 1.1 and OTG, making it the ideal low cost solution for HID (Human Interface Device) developers. They are field upgradeable to the All Speed products for USB 2.0 development and testing.

USB*Mobile* HS Portable Analyzer

The USB*Mobile* HS module is a highly portable bus and protocol analyzer that connects through your computer's PCMCIA port. This PC card size analyzer supports the USB 2.0 and OTG standards, and is fully compatible with the CATC Trace™ software.

USB Advisor Protocol Analyzer

The USB Advisor protocol analyzer is an excellent tool for developing USB 2.0 devices. Like all of our USB systems, this stand-alone unit works in conjunction with the CATC Trace display software.

USB Chief & Chief Plus Protocol Analyzer

The USB Chief analyzer is our lowest cost system for capturing, decoding, and analyzing USB 1.1 full and low speed traffic. The USB Chief Plus analyzer has the added value of USB traffic generation.

Powerful display views for easy analysis of protocol traffic

LeCroy's *Tracer* analysis software gives you a variety of powerful tools for displaying and analyzing bus traffic. The *Tracer* software allows you to organize and display packets, transactions and transfers hierarchically as well as group split transaction together.

The USB analyzer records all the data on the bus. Unfiltered USB traffic contains thousands of packets, which can make it difficult for you to analyze and discover errors within the trace. Within the CATC Trace™ software display, you can preserve the details, but also have an easy way to view the host and device communications.

For instance, you can:

- Eliminate the idle bus traffic by selecting the SOF icon. This narrows down the displayed information to just those packets that contain relevant host and device communications.

- Simplify the trace by selectively hiding endpoints (addresses) In, Out, or all packets. This is especially useful when analyzing bus traffic when multiple devices are attached.

- Organize the information unique to each USB bus by utilizing the built-in device class decodes. This will greatly enhance your ability to comprehend the bus traffic.

Within the displays, Tooltips pop up to provide you with detailed descriptions of the field, including information about the USB specification. The software supports both vendor specific and custom decodes to ease the development of devices and software.

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Command level can be expanded and collapsed to show the packet, transaction and transfer layers.

The CATC Trace display decodes the application layer and alerts you to every potential violation.

CATC USBTracer Bus And Protocol Analyzer - [C:\Program Files\CATC\USBTracer\SampleFiles\DiskOnKeyEnumAndWrite.usb]

File Setup Record Generate Report Search View Window Help

| Transfer | F | Bulk | ADDR | ENDP | Mass | INQUIRY | Dev Typ | Rem | Vendor Id | Product Id | Product Rev | Time Stamp |
| 16 | S | IN | 4 | 1 | Storage | Response | 0x00 | 1 | M-Sys | DiskOnKey | 2.01 | 00008.0094 6420 |

| Transaction | F | IN | ADDR | ENDP | T | Data | ACK | Time Stamp |
| 44 | S | 0x96 | 4 | 1 | 0 | 36 bytes | 0x4B | 00008.0094 6420 |

| Packet | Dir | F | Sync | IN | ADDR | ENDP | CRC5 | EOP | Idle | Time Stamp |
| 394 | --> | S | 00000001 | 0x96 | 4 | 1 | 0x19 | 233.330 ns | 366.650 ns | 00008.0094 6420 |

| Packet | Dir | F | Sync | DATA0 | Data | CRC16 | EOP | Idle | Time Stamp |
| 395 | <-- | S | 00000001 | 0xC3 | 36 bytes | 0x960C | 233.330 ns | 500.000 ns | 00008.0094 6616 |

| Packet | Dir | F | Sync | ACK | EOP | Time | Time Stamp |
| 396 | --> | S | 00000001 | 0x4B | 250.000 ns | 487.133 µs | 00008.0095 0760 |

| Transfer | F | Bulk | ADDR | ENDP | Mass | SBSU Tag | Residue | Status | Time Stamp |
| 17 | S | IN | 4 | 1 | Storage | 814F81C8 | 0x0 | Passed | 00008.0098 7488 |

| Transaction | F | IN | ADDR | ENDP | T | Da... |
| 45 | S | 0x96 | 4 | 1 | 1 | 13 by... |

Status Block Wrapper Signature: dCSWSignature
Command Block Tag: dCSWTag (in Hex)

| Packet | Dir | F | Sync | IN | A... |
| 397 | --> | S | 00000001 | 0x96 | 4 | 1 | 0x19 | 250.000 ns | 383.330 ns | 00008.0098 7488 |

If no status field is shown, the status was GOOD.

Run once   Pkt Trs Trs Xfr

Traffic Summary

Go 0 of ### Packet ###

All reports
- Pkt Packets
  - Token
  - Data
  - Handshake
- Trs Transactions
  - Handshake
- Xfr Transfers
  - Control
- Errors

Ready

Addr /	Endp	OUT	IN	SETUP	PING	S SPLIT	C SPLIT	Total
0	0	1	2	2	0	0	0	5
4	0	12	13	13	0	0	0	38
4	1	249	2270	0	0	0	0	2519
4	1	249	2270	0	0	0	0	2519
		511	4555	15	0	0	0	5081

Packets are grouped and shown in logical order.

Pop up tooltips provide additional information when desired.

The traffic summary gives you valuable reporting and statistical information.

Hyperlink back to the CATC Trace display to see events in context.

Pop Up Tooltips bring the USB specification to your desktop.

```
        CONFIGURATION Descriptor
        ------------------------
Offset|        Field        | Value | Description
------|---------------------|-------|------------------------------------
  0   |       bLength       | 0x09  |The size of this descriptor is 9 bytes
------|---------------------|-------|------------------------------------
  1   |    bDescriptorType  | 0x02  |CONFIGURATION Descriptor Type
------|---------------------|-------|------------------------------------
  2   |     wTotalLength    | 0x0020|The total length of data for this
      |                     |       |configuration is 32. This includes
      |                     |       |the combined length of all the
      |                     |       |descriptors returned
------|---------------------|-------|------------------------------------
  4   |    bNumInterfaces   | 0x01  |This configuration supports 1 interfaces
------|---------------------|-------|------------------------------------
  5   | bConfigurationValue | 0x01  |The value 1 should be used to
      |                     |       |select this configuration
------|---------------------|-------|------------------------------------
  6   |    iConfiguration   | 0x00  |The device doesn't have the string
      |                     |       |descriptor describing this configuration
------|---------------------|-------|------------------------------------
  7   |     bmAttributes    | 0x80  |Configuration characteristics :
      |                     |       |Bit 7: Reserved (set to one) 1
      |                     |       |Bit 6: Self-powered          0
      |                     |       |Bit 5: Remote Wakeup         0
------|---------------------|-------|------------------------------------
  8   |      MaxPower       | 0x2F  |Maximum power consumption of the
      |                     |       |device in this configuration is 94 mA
------|---------------------|-------|------------------------------------
```

Powerful Triggering and Filtering

With a wide assortment of triggering options, the *Tracer* software makes it easier to detect software, driver, and firmware problems. You can trigger on a variety of conditions including various packet types, device requests, bus conditions, errors and many others. Triggers can be set up on almost any sequence of events possible. It also allows you to isolate the important part of the traffic stream, and when you open the trace, it jumps right to that portion of the trace.

Full featured filtering capabilities also help you maximize the memory recording capacity by isolating areas of interest and filtering out unwanted traffic. Both features provide for easier access to the valuable traffic for more in depth analysis.
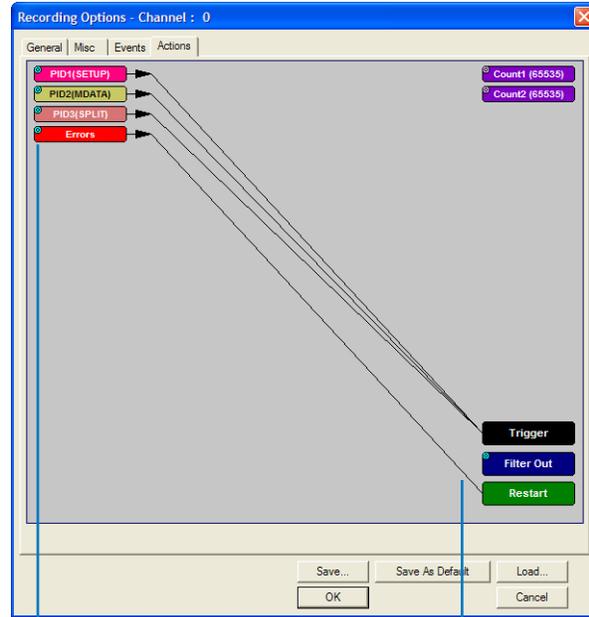
LeCroy's Drag and Drop graphical interface makes sophisticated triggering easy.

In this example, USB *Tracer* analyzer will trigger on three events and restart if an error is detected.
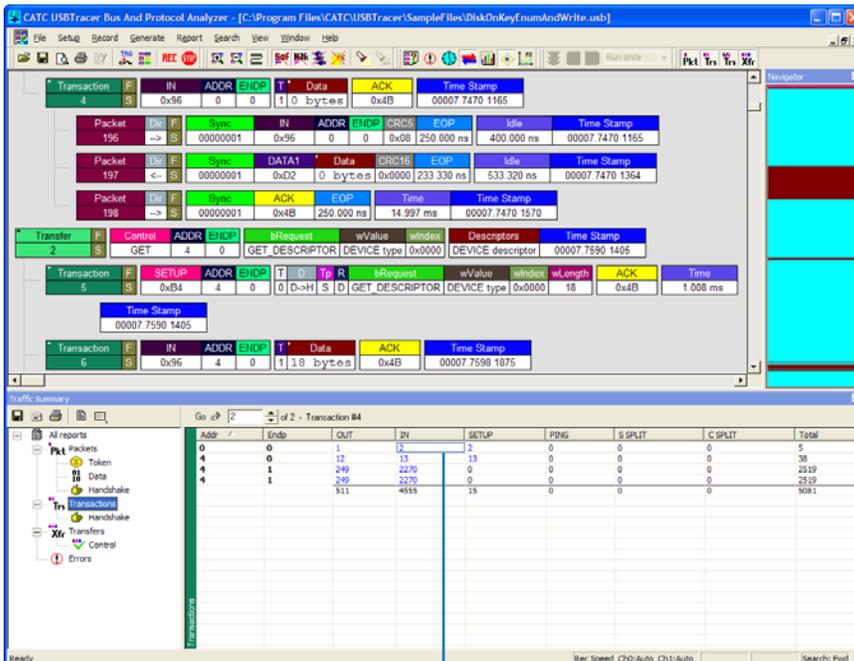
Click on hyperlinks to automatically jump through each occurrence within the trace.

Comprehensive Traffic Reports and Summaries

Our USB solutions are more than just data recorders. The real value is in the analysis of the data. The *Tracer* software generates detailed reports that provide statistics on the occurrence of errors, abnormal bus or timing conditions, and other protocol events within the trace. You can evaluate these metrics at a glance or use them to navigate through the recording since they are hyperlinked back into the CATC Trace. The traffic summary can be printed or saved to text with a single keystroke.

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Search Results Quickly

The advanced search features in the *Tracer* software helps you quickly find what you points of interest. By using the Quick Search, you can select fields right from the drop down menu, such as Go To Trigger, Packet/Transaction/Transfer, Marker or Event. The menus are context sensitive so they only allow you to select events that occurred within the trace.
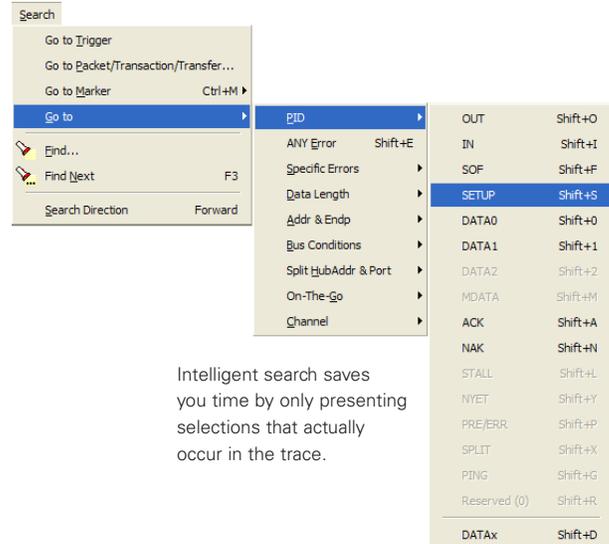
Intelligent search saves you time by only presenting selections that actually occur in the trace.

The CATC Trace display logically groups all transactions that are part of a USB operation.

Colors and graphics are used to represent USB operations and transactions.
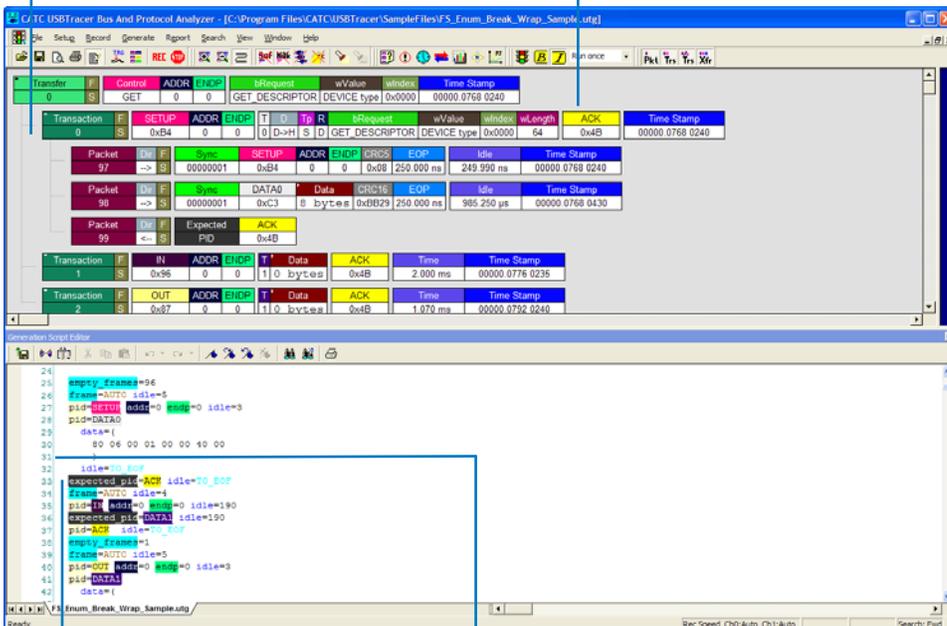
Trainer scripts allow you to easily control every aspect of the file.

Easily transmit simulated data.

Intelligent Traffic Generation

When using USB *Trainer* or USB Chief Plus systems, you have the added value of traffic generation for USB. You can create test patterns or "scripts" by exporting any traffic stream from a pre-viously recorded trace. A text based API can also be used to create packet level traffic files. The ability to insert code errors, or customized data pay-loads, makes it easy to perform corner-case, stress, and limit testing.

Unique to the USB *Trainer* is an Intelliframe mode, which adds interac-tivity to the traffic stream. It allows you to programmatically respond to packets transmitted from the device under test.

A Comprehensive Solution

LeCroy's USB solutions provide you with advanced features necessary to ease the development and testing of USB devices. Combined with powerful hardware, the *Tracer* software makes it easy to understand what occurred on the bus. At every level, you have the ability to drill deeper into the data, to get additional information about the traffic or even the protocol itself.

Let LeCroy's Serial Data Solutions peel back the layers of your USB device to solve your test and verification challenges.

Specifications

USB*Mobile* HS

Host Requirements	Windows 2000, Windows XP or greater, Intel Pentium II processor or greater; with a PCMCIA port
Basic Trigger Events	Packet Identifier, Token Pattern, Frame Pattern, Device Request, Data Pattern, Bus Conditions, Errors, Transactions, Data Length, Splits
Reporting and Statistics	Packet Level, Transaction Level, Transfer Level, Error Reports
Generating Memory Size	64 MB
Power Consumption	Idle: 500 mA (typical) , Active: 560 mA (typical)
Connectors	16-bit Type II PC card, 2 Mini-AB USB receptacles
Temperature: Operating	0 °C to 55 °C (32 °F to 131 °F)
Temperature: Non-Operating	-20 °C to 80 °C (-4 °F to 176 °F)
Humidity: Operating	10% to 90% RH (non-condensing)
Dimensions	5.3" x 2.1" x 0.4" (135 mm x 54 mm x 10.5 mm)
Net Weight	51 g (1.8 oz.)

USB Advisor

Host Requirements	Windows 2000, Windows XP or greater, Intel Pentium II processor or greater; with a USB port
Generating Memory Size	128M DRAM for traffic capture, timing, and other data
Power Consumption	90-254 VAC, 47-63 Hz (universal input), 165W
Connectors	AC Power Connection, External Clock Input (EXT CLK, BNC), Host Connection (USB, type B), Data Connection (Data In/Out, 9-pin DB)
Power	On/Off
Manual Trigger	Forces a trigger event
Detach Device	Detaches the device from the host
Power (PWR)	Lights when analyzer is powered on
Record (REC)	Lights when analyzer is actively recording data
Trigger (TRG)	Lights when triggering an event or during power-on testing
Upload (UPLD)	Lights when uploading data to host
Temperature: Operating	0 °C to 55 °C (32 °F to 131 °F)
Temperature: Non-Operating	-20 °C to 80 °C (-4 °F to 176 °F)
Humidity: Operating	10% to 90% RH (non-condensing)
Dimensions	234 mm x 213 mm x 64 mm (9.2" x 8.4" x 2.5")
Net Weight	1.3 kg (2.8 lbs.)

USB Chief & Chief Plus

Basic Events Detected	Bus Conditions, Token Packet, Setup Transaction, Data Pattern, Hardware Detected Error, Software-analyzed Error, External Signals
Generating Memory Size	128M DRAM for traffic data capture, timing, and other data
Host Requirements	Windows 2000, Windows XP or greater, Intel Pentium II processor or greater; with a USB port
Power Requirements	90-254 VAC, 47-63 Hz (universal input), 165W maximum
Connectors	AC Power Connection, BNC Connection (Reserved), Host Connection (USB, type B), Data Connection (Data In/Out, 37-pin DB), USB Connections for recording (Secondary Record, Record & Generate, type A and type B)
Power	On/Off
Manual Trigger	Forces a trigger event
Detach Device	Detaches the device from the host
Power (PWR)	Lights when powered on
Record (REC)	Lights when actively recording data
Trigger (TRG)	Lights when triggering an event
Upload (UPLD)	Lights when uploading recording memory to the host
Temperature: Operating	0 °C to 55 °C (32 °F to 131 °F)
Temperature: Non-Operating	-20 °C to 80 °C (-4 °F to 176 °F)
Humidity: Operating	10% to 90% RH (non-condensing)
Dimensions	234 mm x 213 mm x 64 mm (9.2" x 8.4" x 2.5")
Net Weight	1.3 kg (2.9 lbs.)

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Specifications

CATC 2500H PLATFORM

USB *Tracer/Trainer*

Host Requirements	Windows 2000, or greater, Intel Pentium II processor or greater; USB port
Recording Memory Size	512 MB for trace capture, timing and control information
Power Requirements	90-254 VAC, 47-63 Hz (universal input), 125W maximum
Connectors	AC power connection, External trigger connection (TRIG IN/OUT, BNC), USB type "B" host computer connection, Breakout Board Data Output Connection (RS232)
Power (PWR)	Lights when power is on
Status (STATUS)	Lights during initialization; Blinks if self-test fails
Manual Trigger Switch	Forces a trigger event when pressed
Dimensions	311 mm x 311 mm x 89 mm (12.2" x 12.2" x 3.5")
Net Weight	3.4 kg (7.5 lbs.)
Temperature: Operating	0 °C to 55 °C (32 °F to 131 °F)
Temperature: Non-Operating	-20 °C to 80 °C (-4 °F to 176 °F)
Humidity: Operating	10% to 90% RH (non-condensing)

USB *Tracer* Plug In Module

Connectors	Dual Recording Channels (USB, types "A" and "B")
Basic Trigger Events	Packet Identifiers, Token Patterns, Frame Patterns, Device Request, Data Pattern, Bus Conditions, Errors, Transactions, Splits
Reporting/Statistics	Packet Level, Transaction Level, Transfer Level, Error Reports
REC (green)	Lights when unit is recording
TRG (orange)	Lights when triggering an event or power-on testing
UPLD (green)	Lights when uploading recording memory to the PC
Dimensions	113 mm x 170 mm x 32 mm (4.5" x 6.7" x 1.3")
Net Weight	0.5 kg (1.0 lb.)

USB *Trainer* Plug In Module

Generating Memory Size	256 Mbytes for trace traffic pattern buffering
Connectors	Dual Generating Channels (USB, type "A")
Switches	Start/Stop allows for manual Trace capture
HighSpeed (green)	Lights when hi-speed is being generated
Classic (orange)	Lights when full or low speed is being generated
Intelli Frame (green)	Lights when Intelliframe traffic is being generated
Dimensions	113 mm x 170 mm x 32 mm (4.5" x 6.7" x 1.3")
Net Weight	0.5 kg (1.0 lb.)

Ordering Information

LeCroy USB Solutions

USB *Tracer/Trainer* All Speed Analyzer/Generator System	US005APB-X
USB *Tracer* All Speed Analyzer System	US005AAB-X
USB *Tracer* All Speed Analyzer CATC Platform Module with OTG	US006MAA-X
USB *Tracer/Trainer* Classic Analyzer/Generator System	US006APA-X
USB *Tracer* Classic Analyzer System	US006AAA-X
USB *Trainer* Generator CATC Platform Module with Device Emulation	US006MGA-X
USB *Trainer* Generator CATC Platform Module	US006MGB-X
USB*Mobile* HS USB 2.0 All Speed Protocol Analyzer	US008UAA-X
USB Advisor All Speed Analyzer	US004UAA-X
USB Chief Plus Classic Analyzer/Generator	US003UPA-X
USB Chief Classic Analyzer	US003UAA-X
USB Parametric Probe	US006UTA-X

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