

Sierra™

SAS/SATA 3G/6G/12G Protocol Test Systems



Complete Protocol Test in a Single Package!

CAPTURE, DISPLAY AND ANALYSIS OF BOTH SAS AND SATA

Key Features

- SAS & SATA Analysis at Data Rates to 12G
- Fully-integrated, Multifunctional System
 - ✓ Analyzer
 - ✓ Exerciser
 - ✓ Jammer
- Fast Lock Time
- Intelligent Triggering
- Hardware Filtering
- Raw Bit Recording
- Error Detection
- Transparent Post-Processing
- SAS & SATA Decoding
- Logical and Chronological Traffic Displays
- Statistical Reporting
- Power Monitoring
- Cascade up to 32 Ports
- External Triggering
- Trace Memory up to 64 GB
- Real-Time Performance Monitoring
- GbE/USB 3.0 Host Interface

The Sierra Protocol Analyzer is the 7th generation of SAS/SATA test platform from Teledyne LeCroy, the leading manufacturer of protocol test systems for high speed serial interfaces. Designed for the latest generation SAS (12G) and SATA (6G), the Sierra product family sets new standards for performance while incorporating a complete range of features in a standalone multi-function system. Leveraging Teledyne LeCroy's extensive expertise in high-speed interface testing, the Sierra provides the most accurate capture, display and analysis of both SAS and SATA protocol traffic at data rates up to 12 Gb/s. The Sierra M122A is available in a two port configuration which makes it an ideal entry point for 6Gb/s SATA applications. The Sierra M124A offers four port configurations for SAS 'wide-port' applications. Both platforms support protocol analysis, traffic generation, and traffic impairment, all within one system.

The Industry's Highest Fidelity Probe Technology

The Sierra M124A is the flagship protocol analyzer platform featuring the industry's first linear probe design. Supporting analysis of up to four 12 Gb/s SAS ports, this custom probe technology known as T.A.P.3™ (Transparent Acquisition Probing) has been field proven in Teledyne LeCroy's market-leading Summit PCIe 3.0 analyzer platform. Designed to non-intrusively record SAS 12 Gb/s signaling, T.A.P.3 technology utilizes a custom linear amplifier and line conditioner that passes through signals that are very close in physical behavior to those on the probe's receiver. Transparent to the system under test, this approach provides the most unambiguous view of the dynamic equalization that is part of SAS 12G link training.

Detailed Protocol Specific Support

Sierra's analysis software are developed specifically for use with the SAS and SATA protocols, and provide extensive protocol decoding, expert error analysis, and context sensitive tool tips when decoding and viewing the captured traffic. This extensive protocol support, combined with the different traffic views, advanced triggering, and data filtering allows engineers to quickly ramp up their SAS- and SATA- expertise. Every engineer becomes a protocol wizard with the support of Sierra's detailed expert analysis.

Flexible and Reliable 12G Test Systems

The Sierra M124A & M122A platforms are designed for accuracy and flexibility. The M124A system supports four recording channels while the M122A offers two recording channels at a lower entry price. Both systems are available in the full SAS 3.0 configuration (3G / 6G / 12G) or with SAS/SATA capabilities (3G / 6G only) allowing users to upgrade to 12G support in the future. Featuring Teledyne LeCroy's T.A.P.3™ probe design, the Sierra platforms provides unmatched accuracy for SAS and SATA protocol analysis. The Sierra enclosure is easily positioned on the bench top or integrated into a 19" rack. Combining best-in-class hardware capabilities with comprehensive analysis features, the Sierra M122A / M124A are the smart choice for SAS/SATA protocol test.



Sierra M124A



Sierra M122A

Customize the Spreadsheet View by Adding Important Fields

I1 (After JAM)	SCSI Cmd.	12 G	Source Address (H)	Destination Address (H)	Operation Code	FUA_NV (H)	FUA (H)	DPO (H)	WRPROTECT (H)	
	1.19.479.697.593 (min)		32	CCCCCCCCDDDDDDDD	50014EE35580A14A	0x2A : Write (10)	0	0	0	0
Logical Block Address (H)		Group Number (H)	Transfer Length (D)	Control (H)	CDB Padding (H)	Payload Data , 4096 Bytes			Task Attribute	Tag (H)
03450408		00	8	00	000000000000	67 01 C7 5F 9B C4 83 A3 E4 8A BF 56 >>			0x0 : Simple	4D59
Status	SenseKey	ASC , ASCQ (H)				Sense Data (H)			LUN (H)	Metrics
0x02 : Check Condition	0xB : Aborted Command	0x4E00: OVERLAPPED COMMANDS ATTEMPTED				70000B0000000000A000000004E0000000000000			0000000000000000	
I1 (After JAM)	Transport	12 G	SSP Frame Type	Hashed Dest SAS Addr (H)	Hashed Src SAS Addr (H)	ReTransmit (H)	Retry Data Frames (H)			
1.19.479.697.593 (min)	210		0x06 : Command	941550	7463AD	0	0			
Tag (H)	Target Port Transfer Tag (H)	Data Offset (H)	Info Unit (H)			CRC (H)	Handshake	Duration		
4D59	FFFF	00000000	0000000000000000000000002A0003450408 >>			94A4A31A	0x0 : ACK	50 (ns)		
I1 (After JAM)	Link	12 G	Source SAS Address (H)	Destination SAS Address (H)	SSP Frame Type	Operation Code				
1.19.479.697.593 (min)	1691		CCCCCCCCDDDDDDDD	50014EE35580A14A	0x06 : Command	0x2A : Write (10)				
Logical Block Address (H)		Transfer Length (H)	Task Attribute	Tag (H)	Link Data (H)	Relative Time	Duration			
03450408		0008	0x0 : Simple	4D59		150 (ns)	50 (ns)			
T1 (After JAM)	Link	12 G	Target	RD	Relative Time	Duration				
1.19.479.698.287 (min)	1694		ACK	----	693 (ns)	3 (ns)				

General	Primitive	SSP Transport	SMP Transport	STP Transport	ATA Command	SCSI Command	SMP Command	Read/Write Command	SAS Address	Protocol Error	Performance	Lanes	Others
Source SAS Address	Destination SAS Address	Protocol Type	OpCode / Command	Tag	LBA	Sector Count	Xfer Length	Payload size	Status	Completion Time			
All	All	All	All	---	All	All	All	All	All	All			
500605B000014024	5000C50000513A31	SSP	Read10	0xA1	0x118377		0x8	8192	Good	89.360 000 61 us			
500605B000014024	5000C50000513A31	SSP	Write10	0x1F5	0xc94a47		0x8	8192	Good	3.293 920 04 ms			
500605B000014024	5000C50000513A31	SSP	Write10	0xB3	0x4337aca		0x8	8192	Good	7.123 186 59 ms			
500605B000014024	5000C50000513A31	SSP	Read10	0x1C0	0x2e13895		0x8	8192	Good	7.713 920 12 ms			
500605B000014024	5000C50000513A31	SSP	Write10	0x1C2	0x109d599		0x8	8192	Good	5.996 493 34 ms			
500605B000014024	5000C50000513A31	SSP	Write10	0xB5	0x109d5a1		0x8	8192	Good	4.027 906 89 ms			
500605B000014024	50001C107154A216	STP	Write FPDMA Queued	0x0	0x15624933	0x8		4096	Normal Output	78.115 974 43 ms			
500605B000014024	50001C107154A215	STP	Write FPDMA Queued	0x0	0x15624933	0x8		4096	Normal Output	78.115 882 87 ms			
500605B000014024	50001C107154A215	STP	Write FPDMA Queued	0x0	0x21384ee1	0x8		4096	Normal Output	7.786 386 97 ms			
500605B000014024	50001C107154A215	STP	Write FPDMA Queued	0x0	0x21384ee1	0x8		4096	Normal Output	7.786 320 21 ms			
500605B000014024	50001C107154A215	STP	Write FPDMA Queued	0x0	0x5fe10e2	0x8		4096	Normal Output	20.132 267 00 ms			
500605B000014024	50001C107154A215	STP	Write FPDMA Queued	0x0	0x5fe10e2	0x8		4096	Normal Output	20.132 200 24 ms			

DEVELOP, TEST, DEBUG AND VALIDATE

Flexible Hardware

The Sierra chassis supports a convenient means for stacking or racking multiple units and still provide access to all data bus ports, controls and connectors on the front panel. Suitable for both bench-top or storage rack environments, the Sierra LCD reports which user is currently connected to the Sierra system, the system IP address and status. Status LEDs provide information on negotiated link speed, protocol error detection, link detection, and whether OOB or data frames are currently on the link.

Host connectivity to the Sierra includes support for both USB and Gigabit Ethernet. Memory configurations - from 16GB to 64GB - can address long recording times. The convenient expansion port allows the Sierra system to adapt to a user's current and future needs. Using plug-in cards, (located on the rear panel) the expansion slot can add capabilities, such as synchronizing trace files from multiple units. The Power Expansion option provides DC power for target devices. It also offers special support for initiating SATA DevSleep (for DUTs that support it) while graphically tracking power consumption (PowerTracker™) by the device. All "6Gbps" M122A configurations include two 'octopus' style Mini-SAS HD to SATA fan-out cables which includes one "straight" and "cross-over" to allow easier cable attach to SATA HDDs & Motherboards.

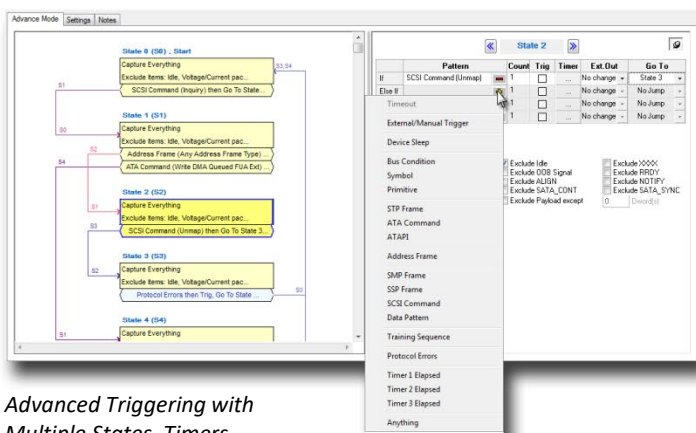
Expert Analysis Software

From the link layer to the application layer, the Sierra analysis suite offers a wide range of traffic views and tools to enable engineers to easily zero-in on areas of interest. For byte level detail, the Column view shows every DWORD in time aligned order. View each frame's composition from SOF to EOF. DWORDs can be viewed in 8b, 10b, and scrambled formats. When working at the frame level, the Text View shows exchanges of frames and accompanying primitives. For viewing commands and frames in sequential order, the Spreadsheet View provides a traditional table format that can be customized to add any field in a separate column. The command level assembles frames and primitives into the logical SCSI operations, data and status transactions. This is critical for wide-port traces where large gaps can occur between command and status. The Frame Inspector decodes both header and payload including the full CDB. All of the views for expert analysis can be used simultaneously and are automatically synchronized and displayed within one application allowing users to view traffic in the most convenient format.

FEATURE COMPARISON	M122A	M124A
ANALYZER	✓	✓
TRAFFIC GENERATOR	✓	✓
JAMMER	✓	✓
MAXIMUM MEMORY	32 GB	64 GB
SPEEDS SUPPORTED	1.5G/3G/6G/12G	1.5G/3G/6G/12G
RECORDING CHANNELS	2	4
SAS 12G VERIFICATION OPTION	✓	✓
CASCADE ANALYZERS	8	8
EXPANSION PORT	✓	✓
POWER TRACKER OPTION	✓	✓
OPTICAL SAS SUPPORT		✓

Pinpoint Triggering

The Sierra provides hardware triggering to pinpoint protocol events of interest. Trigger events can be specified at the lowest levels including error conditions, bus states, primitives (NAK, HOLD, RIP, etc..) and header fields (packet type, LBA, etc...). Users can define sophisticated sequential event trigger scenarios including more complex events such as timing violations between state changes. The Advanced mode offers 24 sequential states, 4 independent timers, multiple counters, the ability to pre-filter at each state, and the ability to assign individual triggers to each port pair. From speed changes to protocol errors, it's easy to trigger on virtually any logical SAS or SATA event.



Advanced Triggering with Multiple States, Timers & Counters

Automatic Post-Processing

The Sierra analyzer software automatically post-processes captured traffic to identify important events. State changes, primitives, SSP and SMP packets, the statistical reports make it easy to determine what was captured at a glance. Protocol errors are automatically identified and labeled. Performance metrics, including throughput, latency and queue depth are appended to each command. ZeroTime™ search boosts productivity by immediately identifying whether searched items actually occurred in the trace.

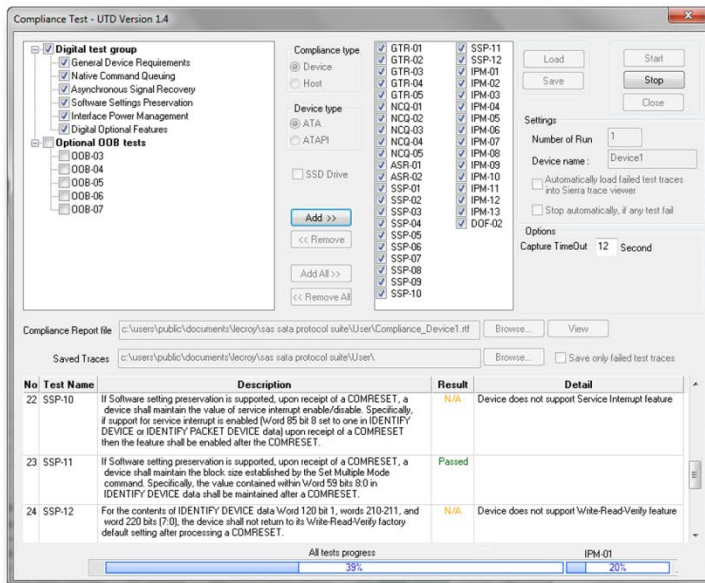
Real-Time Performance Monitor

In normal analyzer mode, the Sierra statistical reports generate a wealth of metrics and traffic information. The system also offers a special Performance Analyzer mode, which displays event metrics over extended periods.

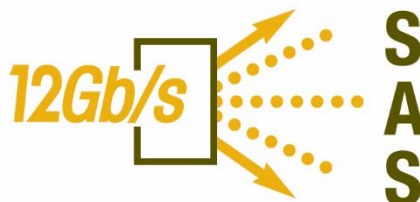
Graphically charting throughput, bus utilization command and frame counts in real-time helps developers identify bottlenecks and latency in the system.

Compliance Test to Ensure Interoperability

The Sierra system is available with a fully automated compliance option for SAS to help insure interoperability between host and target. For SAS 6G & 12G HDD / SSD developers, a complete SAS Verification Test Suite is offered on the M122A/M124A platforms which was developed in conjunction with the UNH-IOL (University of New Hampshire Interoperability Lab). Both systems use host emulation scripts to generate specific traffic conditions. Fully automated, the systems capture and analyze actual responses, then generate HTML reports with PASS/FAIL results for SAS HDDs and SSDs.



Performance Statistics Calculated Automatically



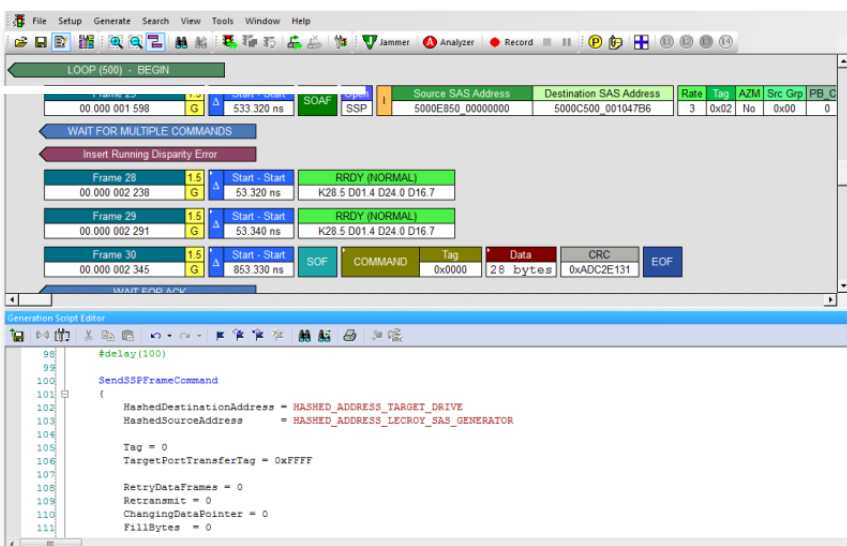
VIEW DATA AT THE FRAME, TRANSPORT OR COMMAND LEVEL

Flexible Traffic Generation

The Sierra Trainer is a script-based traffic generator that gives engineers the ability to control what is being sent down to the bit level, including flexibility for altering the OOB sequence, SNW timing windows, SMP discovery and virtually any ATA or SCSI command. Using previously recorded SAS or SATA traffic files, it's possible to export either host or device side transmissions to the generator allowing users to programmatically re-create error conditions with the Trainer system. Global settings make script development easy by allowing the Sierra to automatically handle out-of-band, speed negotiation, SSP open requests, and acknowledgement frames.

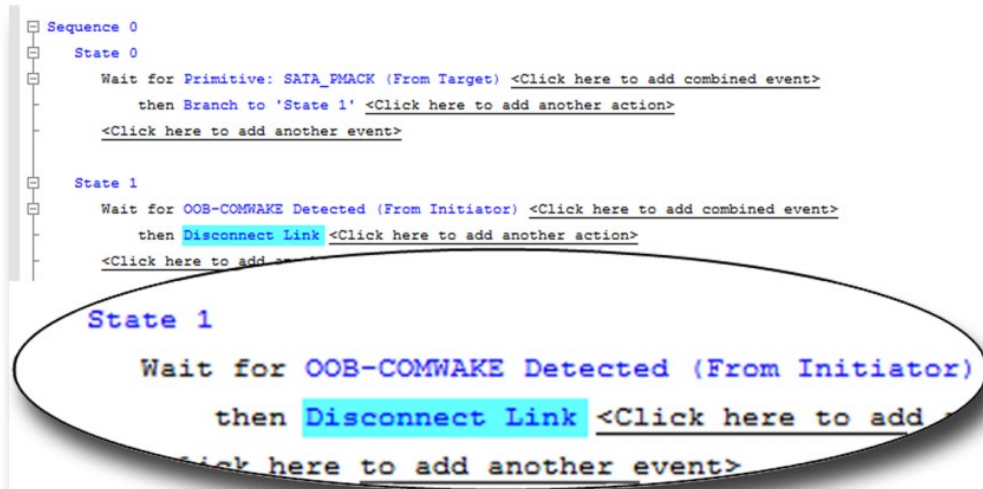
Powerful "Jammer" Error Injection

InFusion is the "jammer" option for the Sierra platform which can programmatically alter or corrupt traffic for both SAS and SATA protocols. Fully integrated within the analyzer platform, InFusion is the ideal tool for stress testing systems while running real traffic and actual workloads. Any primitive or data pattern can be intercepted and changed to a user defined pattern. From dropping entire packets - to changing any field within a frame, the Infusion system can create hundreds of protocol errors "on-the-fly" to test fault recovery.



Easily Generate Invalid or Marginal Traffic Conditions with Trainer

Use InFusion to Insert, Drop or Modify Packets on-the-fly



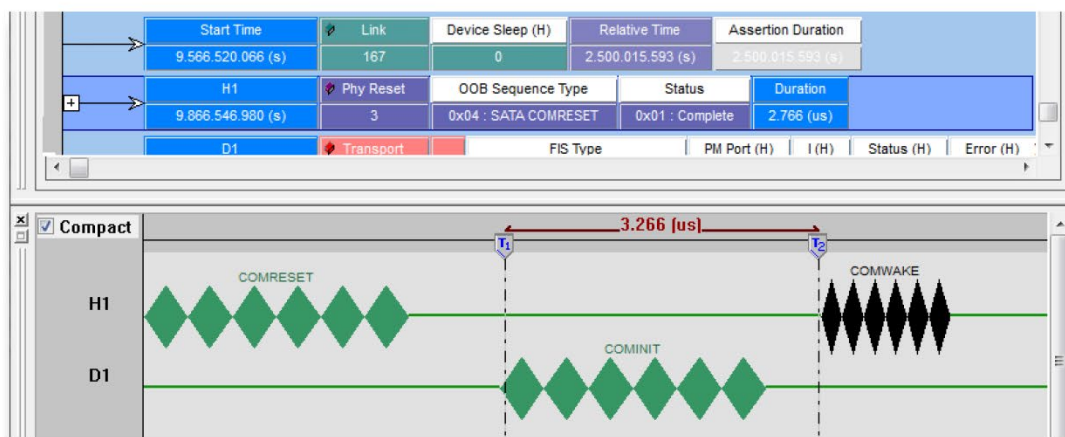
Intelligent Software for Fast Problem Resolution

The Sierra SAS / SATA verification system provides extensive traffic display and analysis capabilities to help locate and identify protocol issues. Any combination of display and filtering options can be configured as the default view making it faster to interpret captured traffic. Navigate traces at the logical command level, then easily drill-down to the chronological packet level. The ability to add capabilities like compliance testing and error injection ensures engineers have all the tools they need to identify problems and complete end-to-end validation testing.

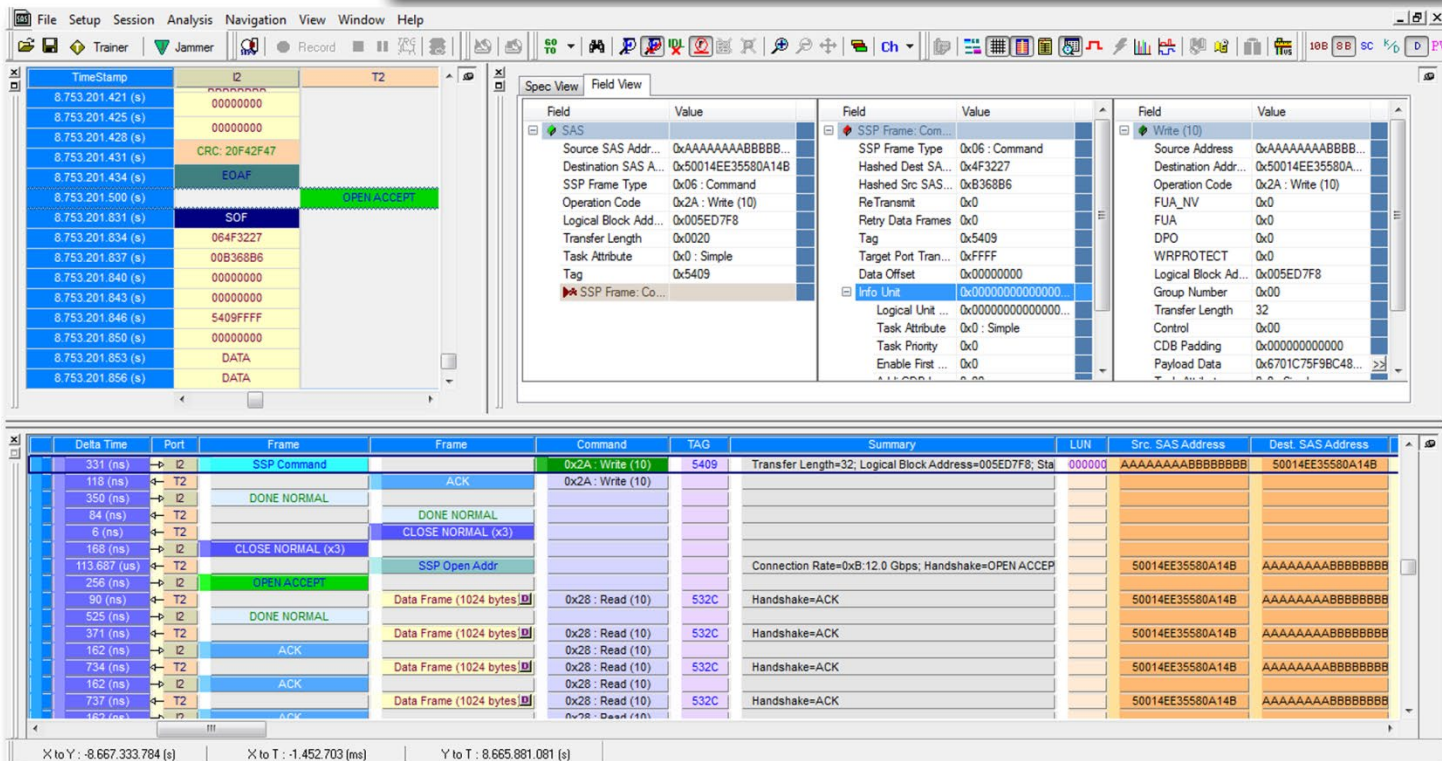


Analyze Dev-Sleep Power Efficiency with Power Tracker

Measure OOB Interval Timing with Waveform View



Simultaneously View Higher and Lower Layers by Combining Views



Specifications

	Sierra M122A	Sierra M124A
Host Machine Minimum Requirements	Microsoft Windows® 10, Windows 8.1, Windows 7, Windows Server 2012, Server 2008R2; 2 GB of RAM; storage with at least 600 MB of free space for the installation of the software and additional space for recorded data; display with resolution of at least 1024x768 with at least 16-bit color depth; USB 2.0 port and/or 100/1000 Mbps Ethernet network interface. For optimal performance, please refer to our recommended configuration in the product documentation.	
Recording Memory Size	16 GB or 32GB	16 GB, 32GB or 64GB
No. of Ports Supported	2 ports	Up to 4 ports
Data Rates Supported	12 Gb/s, 6 Gb/s, 3 Gb/s and 1.5 Gb/s	12 Gb/s, 6 Gb/s, 3 Gb/s and 1.5 Gb/s
Cascadable	Up to 16 ports	Up to 32 ports
Host Interface	USB 2.0, USB 3.0, 10/100/1000baseT Ethernet	USB 2.0, USB 3.0, 10/100/1000baseT Ethernet
Included Cables	Includes one (1) Ext. MiniSAS-HD to 6G Ext MiniSAS cable, 1m; one (1) Ext. MiniSAS-HD to 7-Pin SATA "straight" cable, 1m; & one (1) Ext. MiniSAS-HD to 7-Pin SATA "cross" cable, 1m	Includes two (2) Mini-SAS HD External cables
Data Bus Interface	Mini-SAS HD ports	Mini-SAS HD ports
Front Panel Connectors	Mini-SAS HD (up to 2 ports), External Trigger IN/OUT, USB 3.0 & 10/100/1000 Ethernet Host Interface	Mini-SAS HD (up to 4 ports), External Trigger IN/OUT, USB 3.0 & 10/100/1000 Ethernet Host Interface
Front Panel Indicators	5 LEDs (Trigger, Error, Link, Speed, Frame/OOB) for each of 2 Initiators and Targets; Status LCD & Power	5 LEDs (Trigger, Error, Link, Speed, Frame/OOB) for each of 4 Initiators and Targets; Status LCD; Power
Rear Panel Connectors	AC Power, Expansion Port (Expansion cards are optional)	AC Power, Expansion Port (Expansion cards are optional)
Dimensions	Metal Chassis: 392 x 89 x 372; With Bumpers 418 x 98 x 375 mm (16.5" x 14.75" x 3.8")	Metal Chassis: 392 x 89 x 372; With Bumpers 418 x 98 x 375 mm (16.5" x 14.75" x 3.8")
Weight	3.2Kg (7.8 lbs)	3.6 Kg (8.5 lbs)
Power Requirements	90-254 VAC, 47-63 Hz universal input, 200W maximum	90-254 VAC, 47-63 Hz universal input, 200W maximum

Ordering Information

Product Description

Sierra Hardware Platforms

Sierra M124A SAS/SATA Platform 64 GB Memory
 Sierra M124A SAS/SATA Platform 32 GB Memory
 Sierra M124A SAS/SATA Platform 16 GB Memory
 Sierra M122A SAS/SATA Platform 32 GB Memory
 Sierra M122A SAS/SATA Platform 16 GB Memory

SAS/SATA Analyzer Software

12G (M124) Protocol Analysis Software – 4 ports
 12G (M122/124) Protocol Analysis Software – 2 ports
 6G (M124) Protocol Analysis Software – 4 ports
 6G (M122/124) Protocol Analysis Software – 2 ports

Product Code

SAS-M012A-644-X
 SAS-M012A-324-X
 SAS-M012A-164-X
 SAS-M012A-322-X
 SAS-M012A-162-X

SAS-T012-004-A
 SAS-T012-002-A
 SAS-T612-004-A
 SAS-T612-002-A

Product Description

SAS/SATA Trainer Software

6G Trainer Software -- 1 port
 6G Trainer - License for 2 ports
 6G Trainer - License for 4 ports
 12G Trainer Software -- 4 ports
 12G Trainer Software -- 2 ports
 12G Trainer Software -- 1 port

SAS/SATA Jammer Software

12G InFusion Software – 4 ports
 12G InFusion Software – 2 ports
 12G InFusion Software – 1 port
 6G InFusion Software – 4 ports
 6G InFusion Software – 2 ports
 6G InFusion Software – 1 port

Product Code

SAS-ZG06-001-A
 SAS-ZG06-002-A
 SAS-ZG06-004-A
 SAS-ZG12-004-A
 SAS-ZG12-002-A
 SAS-ZG12-001-A

SAS-J012-004-A
 SAS-J012-002-A
 SAS-J012-001-A
 SAS-J006-004-A
 SAS-J006-002-A
 SAS-J006-001-A



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Local sales offices are located throughout the world.
 Visit our website to find the most convenient location.