SSD Protocol Decodes
for PCI Express® 3.0

SSD Decodes Speed Protocol Testing and Product Development!

Key Features

- **See and understand the traffic**
  - Get useful information quickly
  - More choices of data views
  - More ways to analyze data

- **Find errors fast**
  - Displays show specific decodes of SSD protocol traffic
  - Easy-to-understand traffic displays at multiple layers of the protocol
  - Large trace memory
  - Powerful triggering/filtering

- **Accurate data capture**
  - 100% data capture of all PCI Express traffic
  - Supports all SSD data rates for PCI Express

- **The most extensive suite of SSD Protocol Decodes in the PCIe Protocol Test industry**
  - Provides engineers more information quickly to solve problems, reduce development expenses and bring products to market quickly

PCI**EXPRESS**®
PERFORMANCE SCALABLILTY FOR THE NEXT DECADE

Teledyne LeCroy's PCIe Protocol Suite supports an extensive library of protocol decodes for virtually all PCIe® applications. These decodes enable Teledyne LeCroy analyzers to display data traffic with meaningful and easy-to-understand displays at multiple levels in the protocol stack, and all protocol decode libraries are included as standard features of every Teledyne LeCroy PCI Express protocol analyzer.

Key features for PCIe Solid-state Device (SSD) developers include libraries of decodes specifically designed for SSD protocols, such as NVM Express, SCSI Express and SATA Express. Teledyne LeCroy rapidly implements changes and improvements in specifications as they are approved. For details on current protocols supported, see the PCIe Protocol Suite Readme file in the Software Downloads section of Support on teledynelecroy.com.

NVM Express

NVM Express (NVMe) is sponsored by the NVM Express Work Group. The NVM Express specification defines an optimized register interface, command set and feature set for PCI Express Solid-State Drives (SSDs). The specification defines a native PCI Express interface that streamlines the interface between host controllers and SSD/drive devices, increasing efficiency and performance in NVM Express devices for Enterprise and Client systems.

SCSI Express

The SCSI Express protocol is sponsored by the INCITS T10's SOP-PQI Working group and the SCSI Trade Association. The protocol is based on the SCSI over PCIe (SOP) host interface specification which enables SCSI initiators communicating to SCSI targets over PCIe through the PQI transfer layer. This new protocol will enable SCSI devices to utilize the faster PCIe transport required to meet the demand in next generation enterprise designs.

SATA Express

The SATA Express protocol is sponsored by the Serial ATA International Organization (SATA-IO). This protocol combines the SATA AHCI software specification with the PCIe host interface. SATA Express enables new devices to be developed that utilize the faster PCIe interface and maintain compatibility with a broad base of existing SATA applications.

The storage industry is developing these technologies for several reasons, including faster data access, increased longevity and reliability, less noise, non-volatile storage, and less maintenance of failing hard drives.

SATA Express

ATA 7	D	Port 0	Slot 0	Protocol DM	Command READ DMA EXT	Input	Features 0x0001	Count 0x0001	LBA 0x000000	LBA Ext 0x000000	Device	7 0	6 1	5 0	4 0	0-3 0x0	000
ATA 8	D	Port 0	Slot 0	Protocol DM	Command READ DMA EXT	Input	Features 0x0001	Count 0x0001	LBA 0x000000	LBA Ext 0x000000	Device	7 0	6 1	5 0	4 0	0-3 0x0	000

AHCI 539	H	Port 0	PxCI	Command Issue 0000 0000 0000 0000 0000 0000 0000 0001	Metrics	# Link & Split Trans 1	Time Delta 16.052 us	Time Stamp 0023 . 787 089 682 s

Link Tra 63188	R→	5.0 x1	TLP 1881	Mem	MWr(32) 010:00000	Length 1	RequesterID 000:00:0	Tag 0	Address FA110138	1st BE 1111	Last BE 0000	Data 1 dwor

AHCI 544	H	Port 0	Slot 0	Address 00000000:0009EA80	Data Len 6	CFIS	FIS Type Register FIS – H2D	PMP 0x0	C 1	Command 0x25	Features 0x01	LBA(7:0) 0x00	LBA(15:8) 0x00

AHCI 545	H	Port 0	Slot 0	Address 00000000:0009EB00	Data Len 4	PRDT	DBA 0x00067000	DBAU 0x00000000	Reserved 0x00000000	I 0	DBC 511	Metrics	# Link & Spli 1

AHCI 546	D	Port 0	Slot 0	Address 00000000:00067000	Data Len 128	DATA	Data 128 dwords	Metrics	# Link & Split Trans 4	Time Delta 20.240 us	Time 0023 . 787

NVM Express

NVM Cmd 20	H	OPC Get Features	SQID 0x0000	CQID 0x0000	CID 0x0011	PRP1 00000000:00000000	PRP2 00000000:00000000	FID Volatile Write Cache	SEL Current	WCE 0

NVM Cmd 21	D	OPC Read	SQID 0x0001	CQID 0x0001	CID 0x0003	Data 128 dwords	MPTR 00000000:00000000	PRP1 00000002:2DD9B000	PRP2 00000000:000000

NVM 120	H	Device ID 006:00:0	QID 0x0001	SQyTDBL	IO SQT QID = 1 0x0004	MN NVMeLeCroy000000	Metrics	# Link & Split Trans 1	Time Delta 165.284 us	0039

Link Tra 1927	R→	2.5 x1	TLP 929	Mem	MWr(32) 010:00000	Length 1	RequesterID 000:00:0	Tag 0	Address FE201008	1st BE 1111	Last BE 0000	Data 1 dwo:

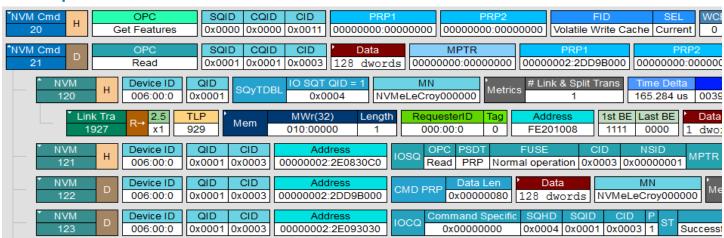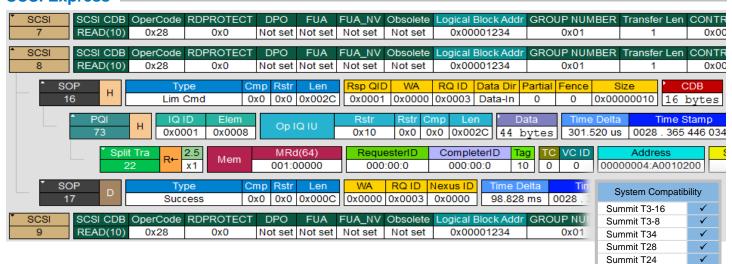| NVM 121	H	Device ID 006:00:0	QID 0x0001	CID 0x0003	Address 00000002:2E0830C0	IOSQ	OPC Read	PSDT PRP	FUSE Normal operation	CID 0x0003	NSID 0x00000001	MPTR

NVM 122	D	Device ID 006:00:0	QID 0x0001	CID 0x0003	Address 00000002:2DD9B000	CMD PRP	Data Len 0x00000080	Data 128 dwords	MN NVMeLeCroy000000	Me

NVM 123	D	Device ID 006:00:0	QID 0x0001	CID 0x0003	Address 00000002:2E093030	IOCQ	Command Specific 0x00000000	SQHD 0x0004	SQID 0x0001	CID 0x0003	P 1	ST Success

SCSI Express

SCSI 7	SCSI CDB READ(10)	OperCode 0x28	RDPROTECT 0x0	DPO Not set	FUA Not set	FUA_NV Not set	Obsolete Not set	Logical Block Addr 0x00001234	GROUP NUMBER 0x01	Transfer Len 1	CONTR 0x00

SCSI 8	SCSI CDB READ(10)	OperCode 0x28	RDPROTECT 0x0	DPO Not set	FUA Not set	FUA_NV Not set	Obsolete Not set	Logical Block Addr 0x00001234	GROUP NUMBER 0x01	Transfer Len 1	CONTR 0x00

SOP 16	H	Type Lim Cmd	Cmp 0x0	Rstr 0x0	Len 0x002C	Rsp QID 0x0001	WA 0x0000	RQ ID 0x0003	Data Dir Data-In	Partial 0	Fence 0	Size 0x00000010	CDB 16 bytes

PQI 73	H	IQ ID 0x0001	Elem 0x0008	Op IQ IU	Rstr 0x10	Rstr 0x0	Cmp 0x0	Len 0x002C	Data 44 bytes	Time Delta 301.520 us	Time Stamp 0028 . 365 446 034

Split Tra 22	R←	2.5 x1	Mem	MRd(64) 001:00000	RequesterID 000:00:0	CompleterID 000:00:0	Tag 10	TC 0	VC ID 0	Address 00000004:A0010200	S

SOP 17	D	Type Success	Cmp 0x0	Rstr 0x0	Len 0x000C	WA 0x0000	RQ ID 0x0003	Nexus ID 0x0000	Time Delta 98.828 ms	Tim 0028 .

SCSI 9	SCSI CDB READ(10)	OperCode 0x28	RDPROTECT 0x0	DPO Not set	FUA Not set	FUA_NV Not set	Obsolete Not set	Logical Block Addr 0x00001234	GROUP NU 0x01

System Compatibility	
Summit T3-16	✓
Summit T3-8	✓
Summit T34	✓
Summit T28	✓
Summit T24	✓

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