



# IBTA Integrators' List

## April 2018 Plugfest



### HCAs (Host Channel Adapter)

(Device Listing indicates Core Compliance)

Manufacturer	Product Description	Model	Speed	HW	FW	SW	Core Compliance	Additional Capabilities				
								SM/SA			IPoIB	
								SM/SA	Version	Multicast	Unicast	Multicast
Mellanox	ConnectX®-3 Pro VPI adapter card, dual-port QSFP, FDR IB (56Gb/s) and 40/56GbE, PCIe3.0 x8	MCX354A-FCCT	FDR	X2	2.42.5000	MLNX_OFED_LINUX-4.3-1.0.1.0	✓	✓	4.8.1	✓	✓	✓
	Connect-IB Host Channel Adapter; dual-port QSFP; FDR 56Gb/s; PCIe3.0 x8	MCB192A-FCAT	FDR	X2	10.16.1020	MLNX_OFED_LINUX-4.3-1.0.1.0	✓	✓	4.8.1	✓	✓	✓
	Connect-IB Host Channel Adapter; dual-port QSFP; FDR 56Gb/s; PCIe3.0 x16	MCB194A-FCAT	FDR	X2	10.16.1200	MLNX_OFED_LINUX-4.3-1.0.1.0	✓	✓	4.8.1	✓	✓	✓
	ConnectX®-4 VPI adapter card, EDR IB (100Gb/s) and 100GbE, dual-port QSFP28, PCIe3.0 x16	MCX456A-ECAT	EDR		12.22.1002	MLNX_OFED_LINUX-4.3-1.0.1.0	✓	✓	4.8.1	✓	✓	✓
	ConnectX-5 VPI adapter card; EDR IB (100Gb/s) and 100GbE; dual-port QSFP28, PCIe4.0 x16	MCX556A-EDAT	EDR		15.1630.0206	MLNX_OFED_LINUX-4.3-1.0.1.0	✓	✓	4.8.1	✓	✓	✓

### SRP Storage Targets

(Device Listing indicates Core Compliance)

Manufacturer	Product Description	Model	Speed	HW	FW	SW	Core Compliance	Additional Capabilities				
								SM/SA			IPoIB	
								SM/SA	Version	Multicast	Unicast	Multicast
NetApp	Dual Controllers ISER FDR Target	Soyuz (E5600)	FDR	1	08.40.10.01	11.41	✓	N/A				

### Switches

(Device Listing indicates Core Compliance)

Manufacturer	Product Description	Model	Ports	Speed	HW	FW	SW	Core Compliance	Advanced Tests					Additional Capabilities				
									Link	Switch/Routing	Enhanced Port 0	Multicast	SM/SA			IPoIB		
													SM/SA	Version	Multicast	Enhanced Port 0 End Node	Unicast	Multicast
Mellanox	SwitchX®@2 InfiniBand to Ethernet gateway 36 QSFP ports - Managed	MSX6036G-2SFS	36	FDR	X2	9.4.5070	3.6.6003	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mellanox	Switch-IB 2 based EDR InfiniBand 1U Switch; 36 QSFP28 ports	MSB7800-ES2F	36	EDR	AD	15.1630.0206	3.6.6003	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



# IBTA Integrators' List

## April 2018 FDR Compliant Cables



Company Info		Cable Information					Integrators' List	Qualification
Company	Part Number	Width	Len (m)	AWG	Equalization	Type	FDR	Tested at
AOI	AQPA9N70ADLN0851	4x	70	N/A	Fiber - Active	QSFP28	Yes	PF32
AOI	AQPA9N70ADLN0851	4x	70	N/A	Fiber - Active	QSFP28	Yes	PF32
AOI	AQPA9N70ADLN0990	4x	70	N/A	Fiber - Active	QSFP28	Yes	PF32
AOI	AQPA9N00ADLN0851	4x	100	N/A	Fiber - Active	QSFP28	Yes	PF32
AOI	AQPA9N00ADLN0851	4x	100	N/A	Fiber - Active	QSFP28	Yes	PF32
AOI	AQPA9N00ADLN0990	4x	100	N/A	Fiber - Active	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF081-SD-R	4x	0.5	30	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF082-SD-R	4x	1	30	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF084-SD-R	4x	1	28	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF086-SD-R	4x	1	26	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF083-SD-R	4x	2	30	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF085-SD-R	4x	2	28	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF087-SD-R	4x	2	26	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF088-SD-R	4x	3	26	Copper - Unequalized	QSFP28	Yes	PF32
Mellanox	MC220731V-003	4x	3	N/A	Fiber - Active	QSFP	Yes	PF33
Mellanox	MFS1200-E003	4x	3	N/A	Fiber - Active	QSFP	Yes	PF33
Mellanox	MC220731V-030	4x	30	N/A	Fiber - Active	QSFP	Yes	PF33
Mellanox	MC220731V-100	4x	100	N/A	Fiber - Active	QSFP	Yes	PF33
Mellanox	MFS1200-E200	4x	200	N/A	Fiber - Active	QSFP	Yes	PF33
Mellanox	MFA1A00-E003	4X	3	N/A	Fiber - Active	QSFP28	Yes	PF33
Mellanox	MFA1A00-E030	4X	30	N/A	Fiber - Active	QSFP28	Yes	PF33
Mellanox	MFA1A00-E050	4X	50	N/A	Fiber - Active	QSFP28	Yes	PF33
Mellanox	MFA1A00-E100	4X	100	N/A	Fiber - Active	QSFP28	Yes	PF33
Mellanox	MC2207130-001	4x	1	30	Copper - Unequalized	QSFP	Yes	PF33
Mellanox	MC2207130-0A1	4x	1.5	30	Copper - Unequalized	QSFP	Yes	PF33
Mellanox	MC2207130-002	4x	2	30	Copper - Unequalized	QSFP+	Yes	PF33
Mellanox	MC2207128-0A2	4x	2.5	28	Copper - Unequalized	QSFP+	Yes	PF33
Mellanox	MC2207128-003	4x	3	28	Copper - Unequalized	QSFP+	Yes	PF33
Mellanox	MCP1600-E00A	4X	0.5	30	Copper - Unequalized	QSFP28	Yes	PF33
Mellanox	MCP1600-E001	4X	1	30	Copper - Unequalized	QSFP28	Yes	PF33
Mellanox	MCP1600-E003	4X	3	26	Copper - Unequalized	QSFP28	Yes	PF33
Mellanox	MCP1600-E03A	4X	3.5	24	Copper - Unequalized	QSFP28	Yes	PF33
Molex LLC	100297-1015	4x	0.5	32	Copper - Unequalized	QSFP28	Yes	PF32
Molex LLC	100297-1051	4x	0.5	30	Copper - Unequalized	QSFP28	Yes	PF32
Molex LLC	100297-3051	4x	0.5	26	Copper - Unequalized	QSFP28	Yes	PF32
Molex LLC	100297-1101	4x	1	30	Copper - Unequalized	QSFP28	Yes	PF32
Molex LLC	100297-3704	4x	2	26	Copper - Unequalized	QSFP28	Yes	PF32



# IBTA Integrators' List

## April 2018 **FDR** Compliant Cables



Company Info		Cable Information					Integrators' List	Qualification
Company	Part Number	Width	Len (m)	AWG	Equalization	Type	FDR	Tested at
Molex LLC	100297-3706	4x	3	26	Copper - Unequalized	QSFP28	Yes	PF32
Volex	VAHS-30-0572	4x	2	30	Copper - Unequalized	QSFP28	Yes	PF33
Volex	VAHS-26-0354	4x	2.5	26	Copper - Unequalized	QSFP28	Yes	PF33
Volex	VAHS-26-0355	4x	3	26	Copper - Unequalized	QSFP28	Yes	PF33
Volex	VAHS-30-0571	4x	1	30	Copper - Unequalized	QSFP56	Yes	PF33



# IBTA Integrators' List

## April 2018 **EDR** Compliant Cables



Company Info		Cable Information					Integrators' List	Qualification
Company	Part Number	Width	Len (m)	AWG	Equalization	Type	EDR	Tested at
AOI	AQPA9N70ADLN0851	4x	70	N/A	Fiber - Active	QSFP28	Yes	PF32
AOI	AQPA9N70ADLN0851	4x	70	N/A	Fiber - Active	QSFP28	Yes	PF32
AOI	AQPA9N70ADLN0990	4x	70	N/A	Fiber - Active	QSFP28	Yes	PF32
AOI	AQPA9N00ADLN0851	4x	100	N/A	Fiber - Active	QSFP28	Yes	PF32
AOI	AQPA9N00ADLN0990	4x	100	N/A	Fiber - Active	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF081-SD-R	4x	0.5	30	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF082-SD-R	4x	1	30	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF084-SD-R	4x	1	28	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF086-SD-R	4x	1	26	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF083-SD-R	4x	2	30	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF085-SD-R	4x	2	28	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF087-SD-R	4x	2	26	Copper - Unequalized	QSFP28	Yes	PF32
Luxshare-ICT	LA0QF088-SD-R	4x	3	26	Copper - Unequalized	QSFP28	Yes	PF32
Mellanox	MFS1200-E003	4x	3	N/A	Fiber - Active	QSFP	Yes	PF33
Mellanox	MFS1200-E200	4x	200	N/A	Fiber - Active	QSFP	Yes	PF33
Mellanox	MFA1A00-E003	4X	3	N/A	Fiber - Active	QSFP28	Yes	PF33
Mellanox	MFA1A00-E030	4X	30	N/A	Fiber - Active	QSFP28	Yes	PF33
Mellanox	MFA1A00-E050	4X	50	N/A	Fiber - Active	QSFP28	Yes	PF33
Mellanox	MFA1A00-E100	4X	100	N/A	Fiber - Active	QSFP28	Yes	PF33
Mellanox	MCP1600-E00A	4X	0.5	30	Copper - Unequalized	QSFP28	Yes	PF33
Mellanox	MCP1600-E001	4X	1	30	Copper - Unequalized	QSFP28	Yes	PF33
Mellanox	MCP1600-E01A	4X	1.5	30	Copper - Unequalized	QSFP28	Yes	PF33
Mellanox	MCP1600-E002	4X	2	28	Copper - Unequalized	QSFP28	Yes	PF33
Mellanox	MCP1600-E02A	4X	2.5	26	Copper - Unequalized	QSFP28	Yes	PF33
Mellanox	MCP1600-E003	4X	3	26	Copper - Unequalized	QSFP28	Yes	PF33
Mellanox	MCP1600-E03A	4X	3.5	24	Copper - Unequalized	QSFP28	Yes	PF33
Molex LLC	100297-1015	4x	0.5	32	Copper - Unequalized	QSFP28	Yes	PF32
Molex LLC	100297-1051	4x	0.5	30	Copper - Unequalized	QSFP28	Yes	PF32
Molex LLC	100297-1101	4x	1	30	Copper - Unequalized	QSFP28	Yes	PF32
Molex LLC	100297-3704	4x	2	26	Copper - Unequalized	QSFP28	Yes	PF32
Molex LLC	100297-3706	4x	3	26	Copper - Unequalized	QSFP28	Yes	PF32
Voilex	VAHS-26-0354	4x	2.5	26	Copper - Unequalized	QSFP28	Yes	PF33
Voilex	VAHS-26-0355	4x	3	26	Copper - Unequalized	QSFP28	Yes	PF33
Voilex	VAHS-30-0571	4x	1	30	Copper - Unequalized	QSFP56	Yes	PF33
Voilex	VAHS-26-0353	4x	2	26	Copper - Unequalized	QSFP56	Yes	PF33



# IBTA Integrators' List

## April 2018 FDR Interoperability List



The following Interoperability results are provided in addition to the compliance results provided in the Integrators List. The Interoperability results are informative only and are not a pre-requisite for devices or cable assemblies to be listed in the Compliance section of the Integrators List. These results represent system tests and include the testing of the entire environment including device transmitters, cable media and device receivers. The Interoperability results include both FDR devices and cables.

While every effort was made to test worst-case conditions, results may vary with alternative port configurations, device and cable manufacturing variation, device firmware and software, traffic density and data patterns, temperature variation, etc. The following information identifies the test conditions used to obtain these Interoperability results.

### Hardware used to test Interoperability

Interop Legend	Description
MSX6036G-2SFS MCB194A-FCAT	Mellanox <b>FDR</b> Sw to Mellanox <b>FDR</b> ConnectIB HCA
MSX6036G-2SFS MCX556A-EDAT	Mellanox <b>FDR</b> Sw to Mellanox <b>EDR</b> ConnectX5 HCA
MSX6036G-2SFS MSB7800-ES2F	Mellanox <b>FDR</b> Sw to Mellanox <b>EDR</b> Switch
MCX354A-FCCT MSB7800-ES2F	Mellanox <b>FDR</b> HCA to Mellanox <b>EDR</b> Switch

Conditions for passing Interop	
<b>Link Width</b>	Link width is @ expected width - i.e. 1x,4x, etc
<b>Link Speed</b>	Link speed is @ expected speed - i.e. FDR
<b>Link Recovery</b>	There must be no errors during the MPI Run
<b>Port Receive Errors</b>	There must be no errors during the MPI Run
<b>Symbol Errors</b>	There must be no errors during the MPI Run
<b>Port xmit Discard</b>	There must be no discards during the MPI Run
<b>MPI Test</b>	The MPI test must run to completion without error

Manufacturer	Description of Hardware	Model	Type	HW	FW	SW	Speed	Status
Mellanox	ConnectX®-3 VPI card, 4X QSFP 56Gb/s	MCX354A-FCCT	HCA		2.42.5000	4.3.1.0.1	<b>FDR</b>	<b>Compliant</b>
Mellanox	Connect-IB HCA QSFP; FDR 56Gb/s; PCIe3.0 x8	MCB192A-FCAT	HCA		10.16.1020	4.3.1.0.1	<b>FDR</b>	<b>Compliant</b>
Mellanox	Connect-IB HCA QSFP; FDR 56Gb/s; PCIe3.0 x16	MCB194A-FCAT	HCA		10.16.1200	4.3.1.0.1	<b>FDR</b>	<b>Compliant</b>
Mellanox	SwitchX® FDR Switch, 36 QSFP ports. Managed GW	MSX6036G-2SFS	Switch	X2	9.4.5070	3.6.6003	<b>FDR</b>	<b>Compliant</b>
Mellanox	SwitchX® EDR Switch, 36 QSFP ports. Managed	MSB7800-ES2F	Switch	X2	15.1630.020	3.6.6003	<b>EDR</b>	<b>Compliant</b>

### Software Used to Test Interoperability

Software	Versions
Operating System	CentOS 7.3
OFED Version	MLNX_OFED_LINUX-4.3-1.0.1.0
Open MPI Used	Open MPI 3.0.1
Open MPI Documentation	<a href="https://www.open-mpi.org/doc/">https://www.open-mpi.org/doc/</a>
Intel Benchmarks	<a href="https://software.intel.com/en-us/imb-user-guide">https://software.intel.com/en-us/imb-user-guide</a>
Test Plan version	<a href="#">IB Interop Testing MOI-2018-03-12.pdf</a>
Test Duration	3-15 minutes

Open MPI Intel Benchmark Tests	
PingPong	Gather
PingPing	Gatherv
Sendrecv	Scatter
Exchange	Scatterv
Allreduce	Alltoall
Reduce	Alltoallv
Reduce_scatter	Bcast
Allgather	Barrier
Allgatherv	



# IBTA Integrators' List

## April 2018 FDR Interoperability List



Company Info		Cable Information					FDR Interop				Qualification
Company	Part Number	Width	Len (m)	AWG	Equalization	Connector Type	MSX6036G-SW MCB194A-FCAT	MSX6036G-SW MCX556A-EDAT	MSX6036G-SW MSB7800-ES2F	MSB7800-ES2F MCX354A-FCCT	Tested at Plugfest
AOI	AQPA9N70ADLN0851	4x	70	N/A	Fiber - Active	QSFP28	Yes	Yes	Yes	Yes	PF32
AOI	AQPA9N70ADLN0851	4x	70	N/A	Fiber - Active	QSFP28	Yes	Yes	Yes	Yes	PF32
AOI	AQPA9N70ADLN0990	4x	70	N/A	Fiber - Active	QSFP28	Yes	Yes	Yes	Yes	PF32
AOI	AQPA9N00ADLN0851	4x	100	N/A	Fiber - Active	QSFP28	Yes	Yes	Yes	Yes	PF32
AOI	AQPA9N00ADLN0851	4x	100	N/A	Fiber - Active	QSFP28	Yes	Yes	Yes	Yes	PF32
AOI	AQPA9N00ADLN0990	4x	100	N/A	Fiber - Active	QSFP28	Yes	Yes	Yes	Yes	PF32
Luxshare-ICT	LA0QF081-SD-R	4x	0.5	30	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Luxshare-ICT	LA0QF082-SD-R	4x	1	30	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Luxshare-ICT	LA0QF084-SD-R	4x	1	28	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Luxshare-ICT	LA0QF086-SD-R	4x	1	26	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Luxshare-ICT	LA0QF083-SD-R	4x	2	30	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Luxshare-ICT	LA0QF085-SD-R	4x	2	28	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Luxshare-ICT	LA0QF087-SD-R	4x	2	26	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Luxshare-ICT	LA0QF088-SD-R	4x	3	26	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Mellanox	MC220731V-003	4x	3	N/A	Fiber - Active	QSFP	Yes	Yes	Yes	Yes	PF33
Mellanox	MFS1200-E003	4x	3	N/A	Fiber - Active	QSFP	Yes	Yes	Yes	Yes	PF33
Mellanox	MC220731V-030	4x	30	N/A	Fiber - Active	QSFP	Yes	Yes	Yes	Yes	PF33
Mellanox	MC220731V-100	4x	100	N/A	Fiber - Active	QSFP	Yes	Yes	Yes	Yes	PF33
Mellanox	MFS1200-E200	4x	200	N/A	Fiber - Active	QSFP	Yes	Yes	Yes	Yes	PF33
Mellanox	MFA1A00-E003	4X	3	N/A	Fiber - Active	QSFP28	Yes	Yes	Yes	Yes	PF33
Mellanox	MFA1A00-E030	4X	30	N/A	Fiber - Active	QSFP28	Yes	Yes	Yes	Yes	PF33
Mellanox	MFA1A00-E050	4X	50	N/A	Fiber - Active	QSFP28	Yes	Yes	Yes	Yes	PF33
Mellanox	MFA1A00-E100	4X	100	N/A	Fiber - Active	QSFP28	Yes	Yes	Yes	Yes	PF33
Mellanox	MC2207130-001	4x	1	30	Copper - Unequalized	QSFP	Yes	Yes	Yes	Yes	PF33
Mellanox	MC2207130-0A1	4x	1.5	30	Copper - Unequalized	QSFP	Yes	Yes	Yes	Yes	PF33
Mellanox	MC2207130-002	4x	2	30	Copper - Unequalized	QSFP+	Yes	Yes	Yes	Yes	PF33
Mellanox	MC2207128-0A2	4x	2.5	28	Copper - Unequalized	QSFP+	Yes	Yes	Yes	Yes	PF33
Mellanox	MC2207128-003	4x	3	28	Copper - Unequalized	QSFP+	Yes	Yes	Yes	Yes	PF33
Mellanox	MCP1600-E00A	4X	0.5	30	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF33
Mellanox	MCP1600-E001	4X	1	30	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF33
Mellanox	MCP1600-E003	4X	3	26	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF33
Mellanox	MCP1600-E03A	4X	3.5	24	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF33
Molex LLC	100297-1015	4x	0.5	32	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Molex LLC	100297-1051	4x	0.5	30	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Molex LLC	100297-3051	4x	0.5	26	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Molex LLC	100297-1101	4x	1	30	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Molex LLC	100297-3704	4x	2	26	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Molex LLC	100297-3706	4x	3	26	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF32
Volex	VAHS-30-0572	4x	2	30	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF33
Volex	VAHS-26-0354	4x	2.5	26	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF33
Volex	VAHS-26-0355	4x	3	26	Copper - Unequalized	QSFP28	Yes	Yes	Yes	Yes	PF33
Volex	VAHS-30-0571	4x	1	30	Copper - Unequalized	QSFP56	Yes	Yes	Yes	Yes	PF33



# IBTA Integrators' List

## April 2018 **EDR** Interoperability List



The following Interoperability results are provided in addition to the compliance results provided in the Integrators List. The Interoperability results are informative only and are not a pre-requisite for devices or cable assemblies to be listed in the Compliance section of the Integrators List. These results represent system tests and include the testing of the entire environment including device transmitters, cable media and device receivers. The Interoperability results include both FDR devices and cables.

While every effort was made to test worst-case conditions, results may vary with alternative port configurations, device and cable manufacturing variation, device firmware and software, traffic density and data patterns, temperature variation, etc. The following information identifies the test conditions used to obtain these Interoperability results.

### Hardware used to test Interoperability

Interop Legend	Description
MSB7800-ES2F MCX556A-EDAT	Mellanox <b>FDR</b> Sw to Mellanox <b>EDR</b> ConnectX5 HCA
MCX456A-ECAT MCX556A-EDAT	Mellanox <b>EDR</b> HCA to Mellanox <b>EDR</b> HCA

Conditions for passing Interop	
<b>Link Width</b>	Link width is @ expected width - i.e. 1x,4x, etc
<b>Link Speed</b>	Link speed is @ expected speed - i.e. FDR
<b>Link Recovery</b>	There must be no errors during the MPI Run
<b>Port Receive Errors</b>	There must be no errors during the MPI Run
<b>Symbol Errors</b>	There must be no errors during the MPI Run
<b>Port xmit Discard</b>	There must be no discards during the MPI Run
<b>MPI Test</b>	The MPI test must run to completion without error

Manufacturer	Description of Hardware	Model	Type	HW	FW	SW	Speed	Status
Mellanox	ConnectX-4 VPI adapter card, EDR IB (100Gb/s) and 100GbE, dual-port	MCX456A-ECAT	HCA		12.22.1002	4.3.1.0.1.0	<b>EDR</b>	<b>Compliant</b>
Mellanox	ConnectX-5 VPI adapter card; EDR IB (100Gb/s) and 100GbE; dual-port	MCX556A-EDAT	HCA		16.22.1002	4.3.1.0.1.0	<b>EDR</b>	<b>Compliant</b>
Mellanox	Switch-IB 2 based EDR InfiniBand 1U Switch; 36 QSFP28 ports	MSB7800-ES2F	Switch		15.1630.0206	3.6.6003	<b>EDR</b>	<b>Compliant</b>

### Software Used to Test Interoperability

Software	Versions
Operating System	CentOS 7.3
OFED Version	MLNX_OFED_LINUX-4.3-1.0.1.0
Open MPI Used	Open MPI 3.0.1
Open MPI Documentation	<a href="https://www.open-mpi.org/doc/">https://www.open-mpi.org/doc/</a>
Intel Benchmarks	<a href="https://software.intel.com/en-us/imb-user-guide">https://software.intel.com/en-us/imb-user-guide</a>
Test Plan version	<a href="#">IB Interop Testing MOI-2018-03-12.pdf</a>
Test Duration	3-15 minutes

Open MPI Intel Benchmark Tests	
PingPong	Gather
PingPing	Gatherv
Sendrecv	Scatter
Exchange	Scatterv
Allreduce	Alltoall
Reduce	Alltoallv
Reduce_scatter	Bcast
Allgather	Barrier
Allgatherv	



# IBTA Integrators' List

## April 2018 **EDR** Interoperability List



Company Info		Cable Information					EDR Interop		Qualification
Company	Part Number	Width	Len (m)	AWG	Equalization	Connector Type	MSB7800-ES2F MCX556A-EDAT	MCX456A-ECAT MCX556A-EDAT	Tested at Plugfest
AOI	AQPA9N70ADLN0851	4x	70	N/A	Fiber - Active	QSFP28	Yes	Yes	PF32
AOI	AQPA9N70ADLN0851	4x	70	N/A	Fiber - Active	QSFP28	Yes	Yes	PF32
AOI	AQPA9N70ADLN0990	4x	70	N/A	Fiber - Active	QSFP28	Yes	Yes	PF32
AOI	AQPA9N00ADLN0851	4x	100	N/A	Fiber - Active	QSFP28	Yes	Yes	PF32
AOI	AQPA9N00ADLN0990	4x	100	N/A	Fiber - Active	QSFP28	Yes	Yes	PF32
Luxshare-ICT	LA0QF081-SD-R	4x	0.5	30	Copper - Unequalized	QSFP28	Yes	Yes	PF32
Luxshare-ICT	LA0QF082-SD-R	4x	1	30	Copper - Unequalized	QSFP28	Yes	Yes	PF32
Luxshare-ICT	LA0QF084-SD-R	4x	1	28	Copper - Unequalized	QSFP28	Yes	Yes	PF32
Luxshare-ICT	LA0QF086-SD-R	4x	1	26	Copper - Unequalized	QSFP28	Yes	Yes	PF32
Luxshare-ICT	LA0QF083-SD-R	4x	2	30	Copper - Unequalized	QSFP28	Yes	Yes	PF32
Luxshare-ICT	LA0QF085-SD-R	4x	2	28	Copper - Unequalized	QSFP28	Yes	Yes	PF32
Luxshare-ICT	LA0QF087-SD-R	4x	2	26	Copper - Unequalized	QSFP28	Yes	Yes	PF32
Luxshare-ICT	LA0QF088-SD-R	4x	3	26	Copper - Unequalized	QSFP28	Yes	Yes	PF32
Mellanox	MFS1200-E003	4x	3	N/A	Fiber - Active	QSFP	Yes	Yes	PF33
Mellanox	MFS1200-E200	4x	200	N/A	Fiber - Active	QSFP	Yes	Yes	PF33
Mellanox	MFA1A00-E003	4X	3	N/A	Fiber - Active	QSFP28	Yes	Yes	PF33
Mellanox	MFA1A00-E030	4X	30	N/A	Fiber - Active	QSFP28	Yes	Yes	PF33
Mellanox	MFA1A00-E050	4X	50	N/A	Fiber - Active	QSFP28	Yes	Yes	PF33
Mellanox	MFA1A00-E100	4X	100	N/A	Fiber - Active	QSFP28	Yes	Yes	PF33
Mellanox	MCP1600-E00A	4X	0.5	30	Copper - Unequalized	QSFP28	Yes	Yes	PF33
Mellanox	MCP1600-E001	4X	1	30	Copper - Unequalized	QSFP28	Yes	Yes	PF33
Mellanox	MCP1600-E01A	4X	1.5	30	Copper - Unequalized	QSFP28	Yes	Yes	PF33
Mellanox	MCP1600-E002	4X	2	28	Copper - Unequalized	QSFP28	Yes	Yes	PF33
Mellanox	MCP1600-E02A	4X	2.5	26	Copper - Unequalized	QSFP28	Yes	Yes	PF33
Mellanox	MCP1600-E003	4X	3	26	Copper - Unequalized	QSFP28	Yes	Yes	PF33
Mellanox	MCP1600-E03A	4X	3.5	24	Copper - Unequalized	QSFP28	Yes	Yes	PF33
Molex LLC	100297-1015	4x	0.5	32	Copper - Unequalized	QSFP28	Yes	Yes	PF32
Molex LLC	100297-1051	4x	0.5	30	Copper - Unequalized	QSFP28	Yes	Yes	PF32
Molex LLC	100297-1101	4x	1	30	Copper - Unequalized	QSFP28	Yes	Yes	PF32
Molex LLC	100297-3704	4x	2	26	Copper - Unequalized	QSFP28	Yes	Yes	PF32
Molex LLC	100297-3706	4x	3	26	Copper - Unequalized	QSFP28	Yes	Yes	PF32
Volex	VAHS-26-0354	4x	2.5	26	Copper - Unequalized	QSFP28	Yes	Yes	PF33
Volex	VAHS-26-0355	4x	3	26	Copper - Unequalized	QSFP28	Yes	Yes	PF33
Volex	VAHS-30-0571	4x	1	30	Copper - Unequalized	QSFP56	Yes	Yes	PF33
Volex	VAHS-26-0353	4x	2	26	Copper - Unequalized	QSFP56	Yes	Yes	PF33



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# InfiniBand Trade Association

## Plugfest 33 Test Equipment Providers

The **IBTA** wishes to thank **Anritsu, Keysight, Molex, Software Forge, Ace Unitech** and **Wilder Technologies** for providing the following test equipment and software for the IBTA Plugfests. All this equipment is provided free of charge for the benefit of the InfiniBand community and the IBTA Plugfests would not be possible without this equipment.

## Anritsu - Signal Quality Analyzers MP1800A

The MP1800A Signal Quality Analyzer is an expandable plug-in modular BERT supporting wideband bit rates from 0.1 to 32.1 Gb/s for versatile signal integrity analysis applications, such as InfiniBand EDR (26G x 4), 100 GbE (25G x 4), OTU-4 (28G x 4), 32G DP-QPSK, CEI-28G and 32G FC.

### MP1800A System Features:

- Pulse Pattern Generator (PPG) supports output of high-quality, low jitter, and high amplitude signals.
- Error Detector (ED) with high input sensitivity supporting signal analysis, such as Bathtub Jitter and Eye Diagram Measurements. 32G Clock Recovery.
- Error Detector Bathtub measurements for jitter (J2 & J9) measurements.
- Jitter Modulation for SJ/RJ/BUJ/SSC generation and supporting Jitter Tolerance tests.

### IBTA Application:

- QDR, FDR and EDR Active Cable Time Domain Testing (ATD).
- Multi-channel PPG used to create victim and all aggressor traffic.
- Jitter Modulation Source is used to inject jitter onto the victim channel to create stressed conditions.
- Multi-Channel error detection for BER analysis of stressed receiver testing.

### MP1800A Literature:

1. <http://www.anritsu.com/en-US/Products-Solutions/Products/MP1800A.asp>
2. <https://dl.cdn-anritsu.com/en-en/test-measurement/files/Brochures-Datasheets-Catalogs/Brochure/mp1800a-32g-e11600.pdf>



**MP1800A** Front View

## Anritsu - MP1825B - 4Tap Emphasis

Combined use of the MP1800A and the MP1825B 4Tap Emphasis generates 2 and 3-tap pre-emphasis signals for high speed interconnects up to 32.1 Gb/s, such as InfiniBand EDR (26G x 4), CEI-28G and 32G FC, as well as 4-tap signals.

As a compact remote unit, the MP1825 4Tap Emphasis can be placed very close to the DUT, keeping cables short and preserving high signal quality. Precision signal integrity analysis is supported by pre-emphasis. In addition, MP1825 supports highly accurate Jitter Tolerance measurements due to transparency of the clock and data paths through the unit.

### IBTA Application:

- QDR, FDR and EDR Active Cable Time Domain Testing (ATD)
- Precise adjustment of victim input signal characteristics such as DDWPS and Eye Mask parameters

### MP1825B - 4Tap Emphasis Literature:

1. <http://www.anritsu.com/en-US/Products-Solutions/Products/MP1825B.aspx>
2. <http://www.anritsu.com/en-US/Downloads/Brochures-Datasheets-and-Catalogs/Brochure/DWL8910.aspx>



MP1825B Front View

## Anritsu – MP2100B- BERTWave

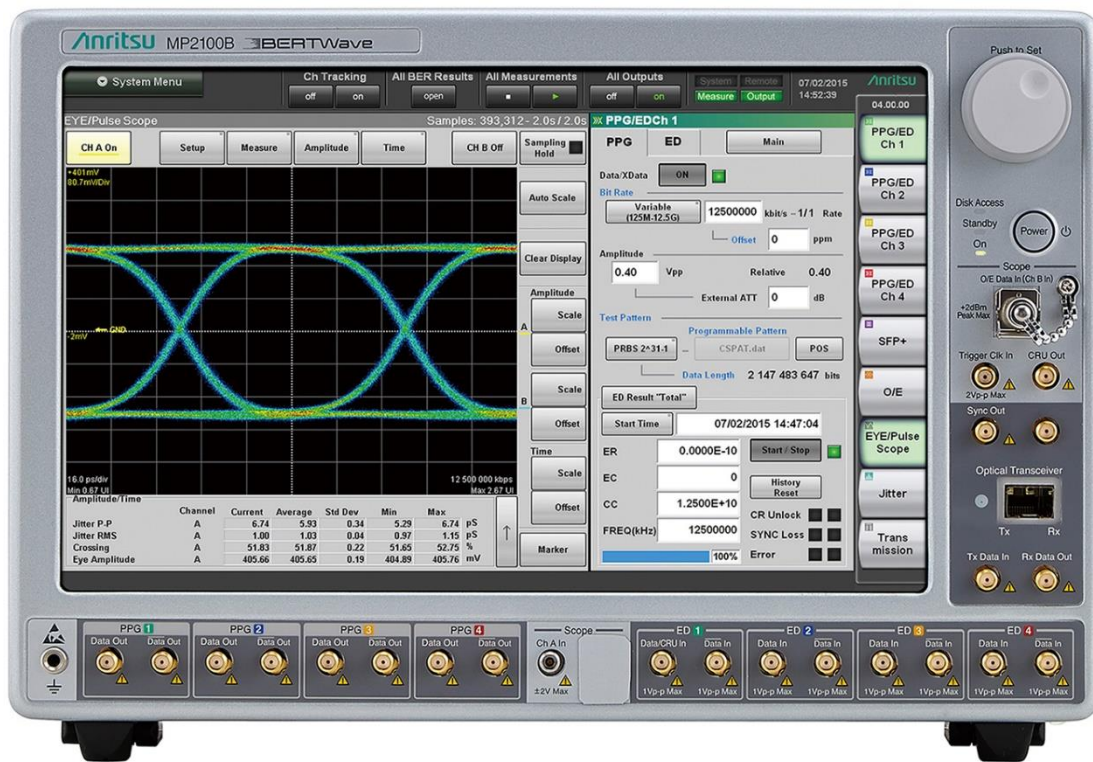
The MP2100B BERTWave supports simultaneous BER measurements and eye pattern analysis for evaluating active optical devices. The Jitter Analysis Software provides accurate jitter analysis and decomposition.

### IBTA Application:

- QDR / FDR Active Cable Time Domain Testing (ATD).
- 25GHz BW Sampling Scope
- Eye Mask functions for Victim Input calibration and DUT Output measurements
- Jitter Decomposition (TJ, DJ, J2, J9, DDWPS) for Victim Input Calibration / DUT Output measurements

### MP2100B- BERTWave Literature:

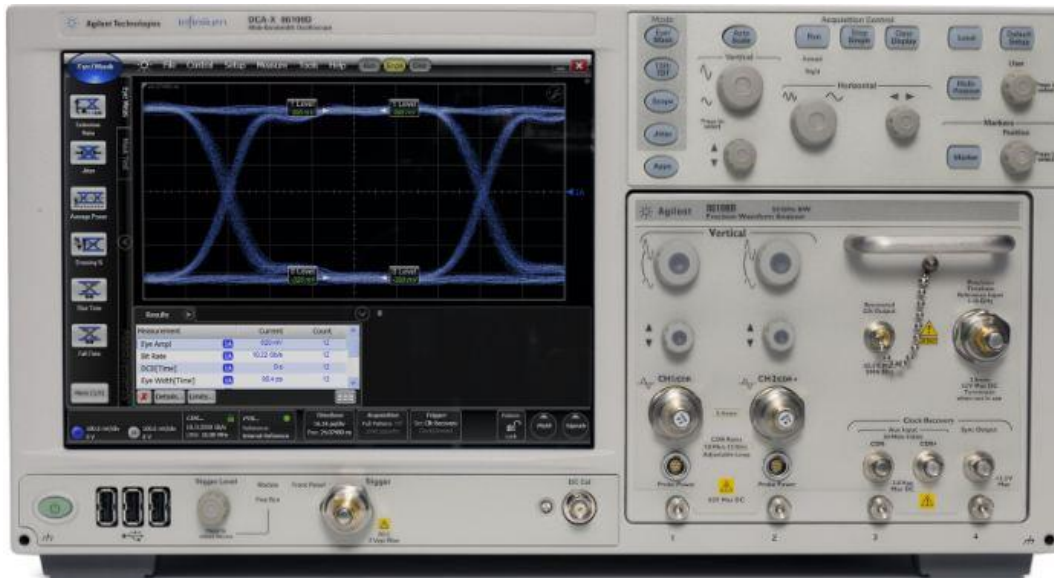
1. <https://www.anritsu.com/en-US/test-measurement/products/mp2100b>
2. <https://dl.cdn-anritsu.com/en-en/test-measurement/files/Brochures-Datasheets-Catalogs/Brochure/mp2100b-e1300.pdf>



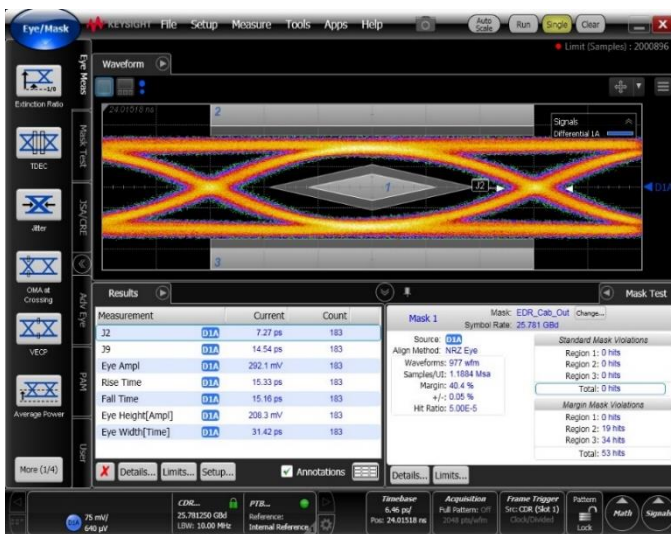
MP2100A Front View

## Keysight - Sampling Scope

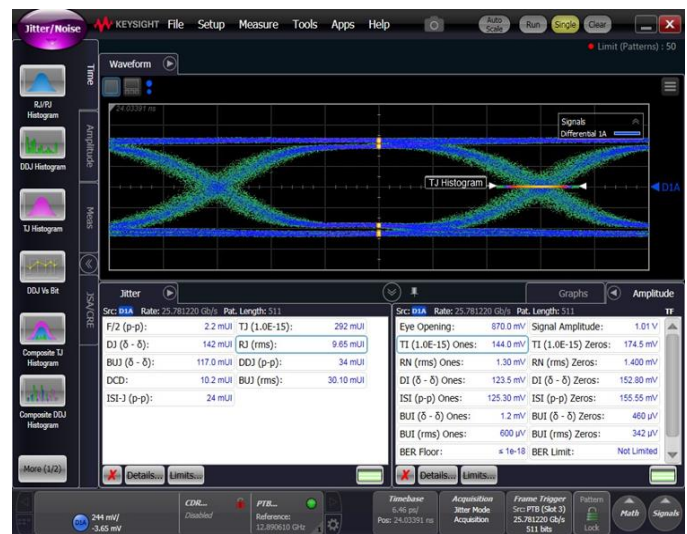
The 86108B Precision Waveform Analyzer, a plug-in module used with the Keysight 86100C/D Infiniium DCA family of oscilloscopes, has been engineered to provide precision measurements on high-speed electrical communications systems and components. With industry-best residual jitter below 50 fs rms (typical), channel bandwidths to 50 GHz, and an integrated instrumentation grade hardware clock recovery circuit, the 86108B provides accurate jitter analysis, eye diagram, and waveform characterization on signals from 50 Mb/s to 32 Gb/s.



86100D\_DCA-X\_with\_86108B\_module



Eye Mask, J2, J9, Time Domain



Eye Width & Height, Jitter Analysis

### Links

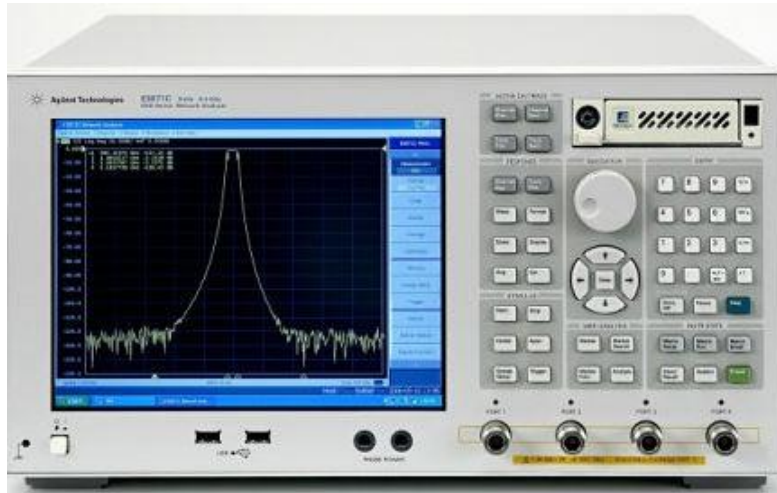
1. 86100D DCA-X Wide-Bandwidth Oscilloscope: [86100D](#)
2. 86108B Precision Waveform Analyzer: [86108B](#)

**IBTA Application:** FDR and EDR HCA and Switch physical layer testing, and EDR Active Cable Time Domain testing.

## Keysight - Network Analyzers

### 1) ENA used in FDR Cables testing

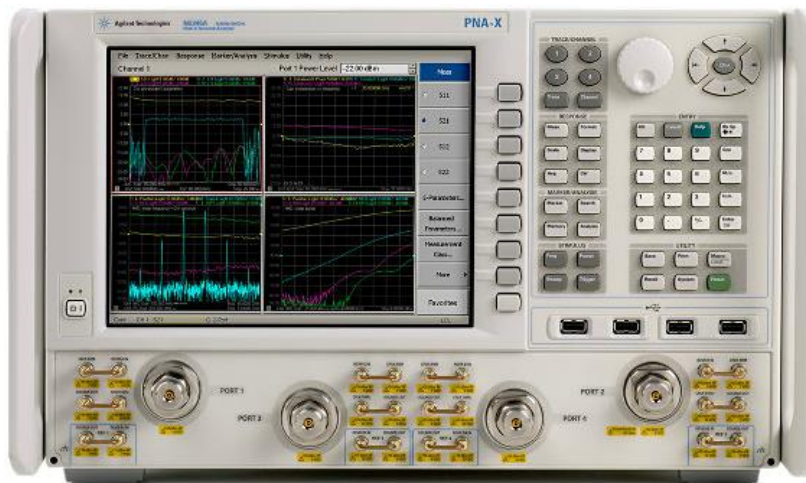
- a) [E5071C](#): 20 GHz ENA Series Network Analyzer
- b) E5071C Data Sheet: <http://literature.cdn.keysight.com/litweb/pdf/5989-5479EN.pdf>



20 GHz ENA Series Network Analyzer

### 2) N5244A PNA-X Microwave Network Analyzer used in EDR Cables testing

- a) [N5244A](#): 43.5 GHz ENA Series Network Analyzer
- b) N5244A PNA-X Data Sheet: <http://literature.cdn.keysight.com/litweb/pdf/N5245-90008.pdf>

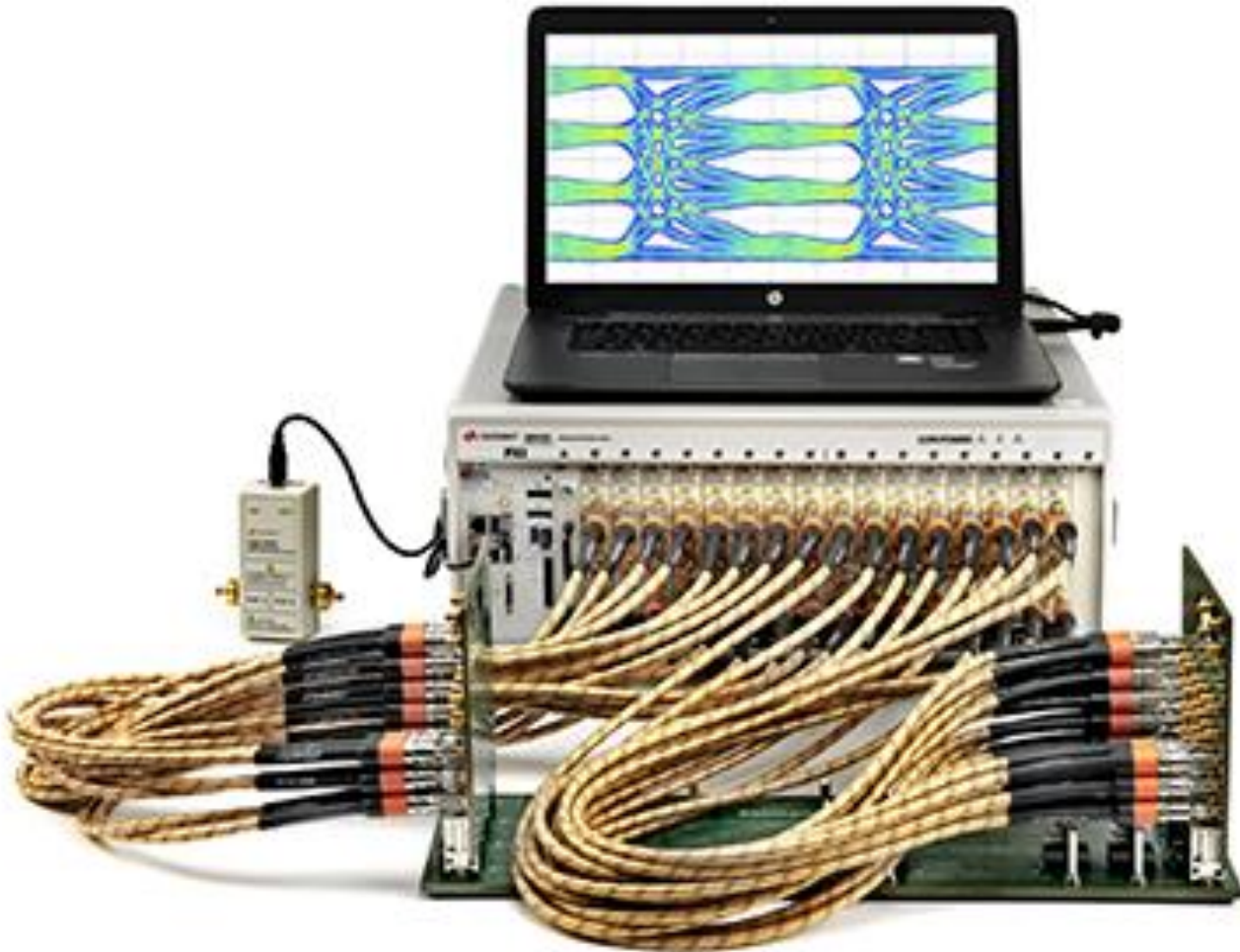


### IBTA Application:

- FDR Device Physical Layer testing: SDDxx, SCCxx and SDCxx
- FDR and EDR Cable testing. ICN, ICMCN, SDDxx, SCCxx and SDCxx

### 3) 32 Port VNA used in FDR and EDR Cable testing since PF29

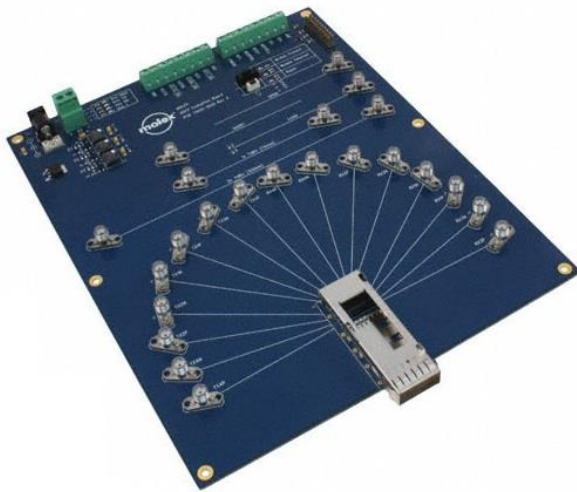
- a) [M9375A](#): PXIe Vector Network Analyzer
- b) [M9019A](#): M9019A PXIe Chassis
- c) PLTS: Physical Layer Test Suite – software to process s32p files



#### **IBTA Application:**

- FDR and EDR Cable testing. ICN, ICMCN, ILD, SDDxx, SCCxx and SDCxx

## Molex – Module Compliance Boards (MCB)



**Molex QDR QSFP Test Board**

[0739313022](#) QDR QSFP Evaluation Board



**Molex FDR & EDR zQSFP+ Test Board**

[1111143022](#) zQSFP+ Evaluation Board

## Molex QDR CXP Test Board

Part Number: 73931-3442



Please contact a Molex Representative via [www.molex.com](http://www.molex.com) to purchase this board.

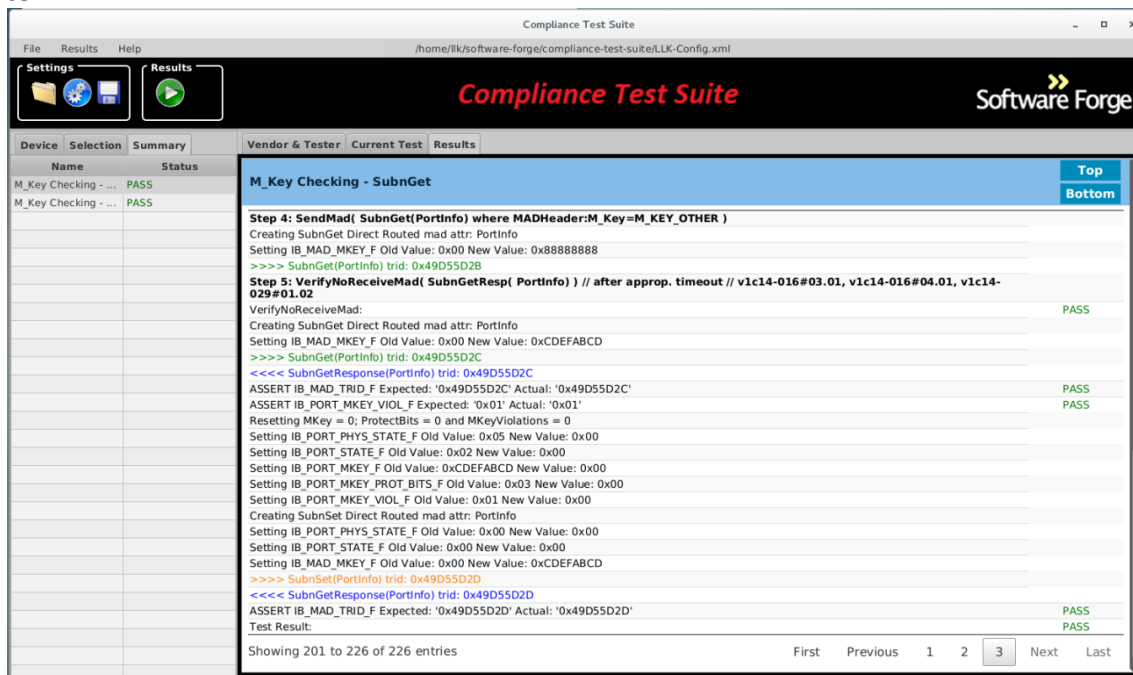
### IBTA Applications:

- CXP & QSFP MCB
  - QDR TDR Cable Testing
- zQSFP+
  - QDR, FDR and EDR Active Cable Time Domain Testing (ATD)
  - FDR and EDR VNA testing



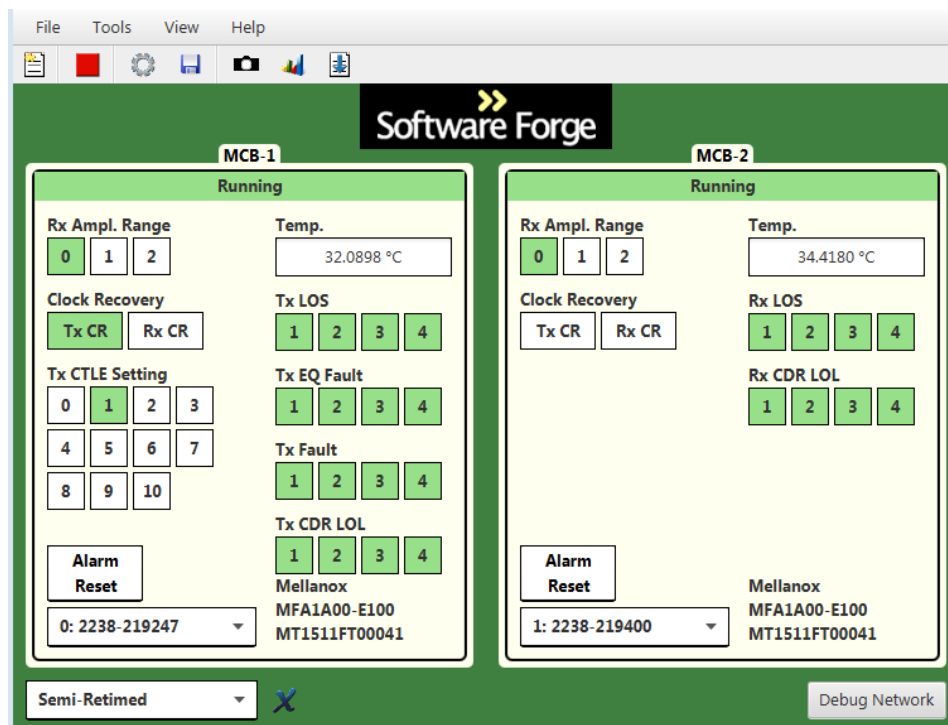
## Software Forge – Compliance Test Suite (CTS)

The current version of CTS provides InfiniBand Protocol Layer testing. It is based on the Compliance and Interoperability Working Group InfiniBand Test Specification ([Volume 3](#)). This tool has replaced the old Agilent TCL test suite.



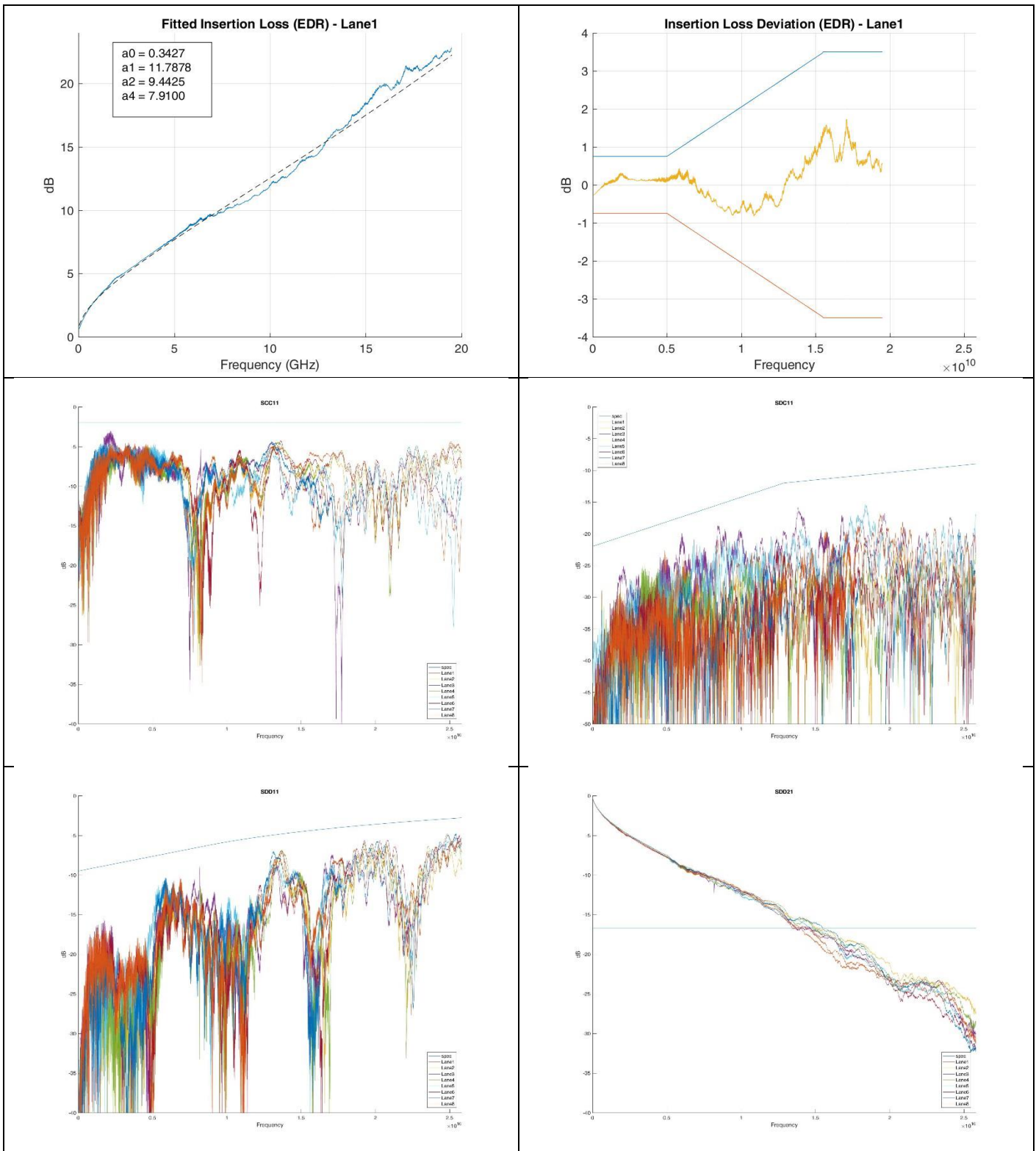
## Software Forge – EEPROM Command Center (ECC)

The EEPROM Command Center is an application which enables the user to control and monitor the status of the QSFP memory maps. The user can write to writable fields of the QSFP memory map and easily export summaries of the results.



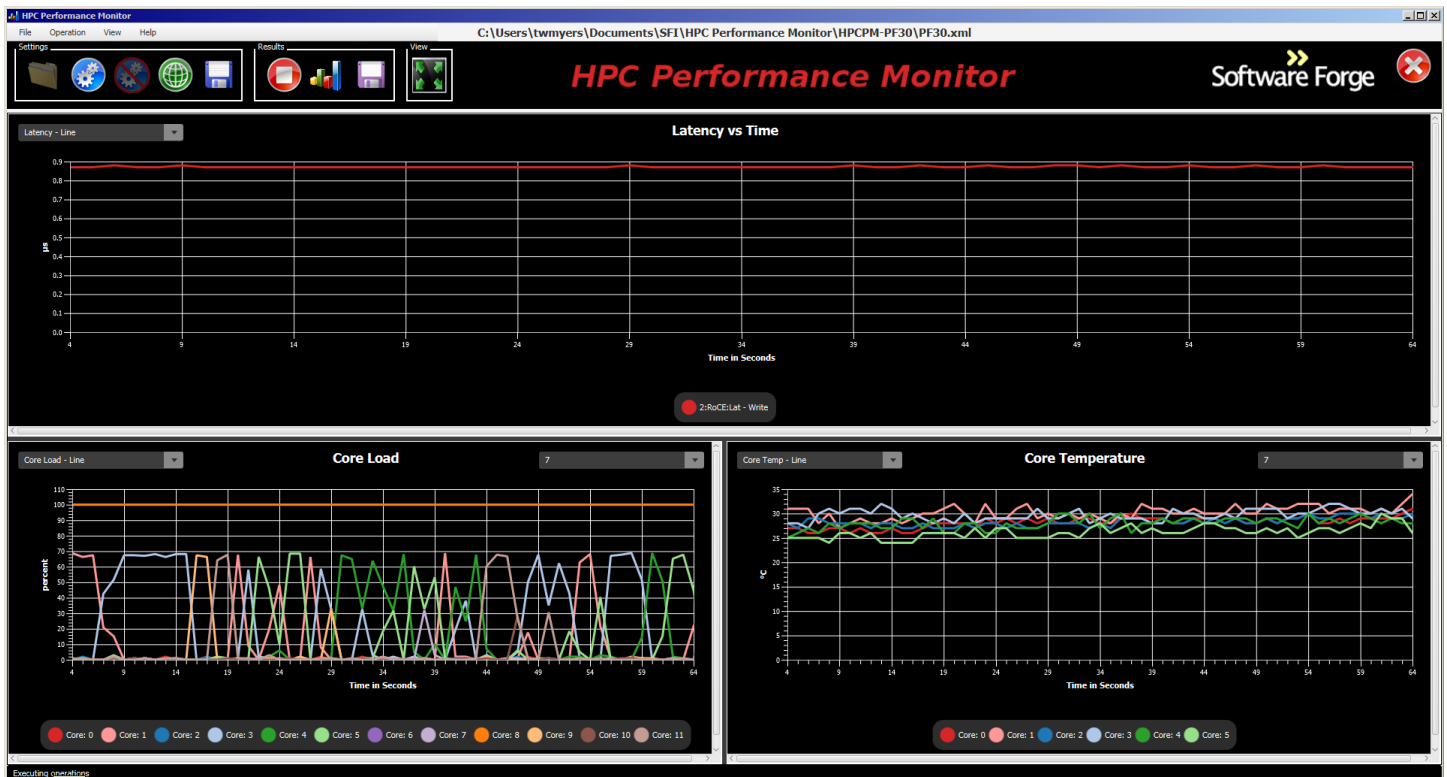
## Software Forge – Vector Network Analyzer (VNA) MATLAB Application

This Application analyzes and processes the s32p VNA data so that the results are available immediately after the data is collected. This has helped reduce the data analysis time from months to minutes.



## Software Forge – High Performance Computing – Performance Monitor ([HPC-PM](#))

The High Performance Computing – Performance Monitor (HPC-PM) measures network performance of RDMA and/or TCP connections. The tool can be used for network diagnostics as well as engineering.



## Total Phase

### I2C/SPI Host Adapter Test fixture

The Aardvark I2C/SPI Host Adapter is a fast and powerful I2C bus and SPI bus host adapter through USB. It allows a developer to interface a Windows, Linux, or Mac OS X PC via USB to a downstream embedded system environment and transfer serial messages using the I2C and SPI protocols.



<http://www.totalphase.com/products/aardvark-i2cspi/?gclid=ClzW2sDjg8QCFWQV7Aod3RwAvA>

### EEPROM Programming Kit

Total Phase has bundled together a complete set of development tools and accessories that allow developers to erase, program, and verify serial EEPROMs.



<http://www.totalphase.com/catalog/product/view/id/24/s/eeprom-devkit/category/4/>

**IBTA Application:** Used to program EEPROM cable modules when doing ATD testing and in general for reprogramming EEPROMs as needed.

## Ace Unitech – Variable ISI Channel

### CLE-1000-S2

Designed as a variable Inter-Symbol-Interference (ISI) channel for high speed serial interface stress tests. It controls the insertion loss continuously at 0.1% step (1,000 steps) in its dynamic range for fine adjustment. The differential transmission lines are totally passive and DC coupled. The adjusted insertion loss amount is reliably repeatable and stable for secure test results. The control is done by the volume dial on the front panel and/or PC remote via USB for automated calibration. Three (3) models of different loss range are prepared to cover various data rates. 4ch versions are also available. The CLE1000 is a convenient ISI channel, applicable for various standard stress tests and compliance tests.

#### IBTA Application:

- EDR Active Cable Time Domain Testing (ATD)
- Precise adjustment of frequency-dependent input channel loss.

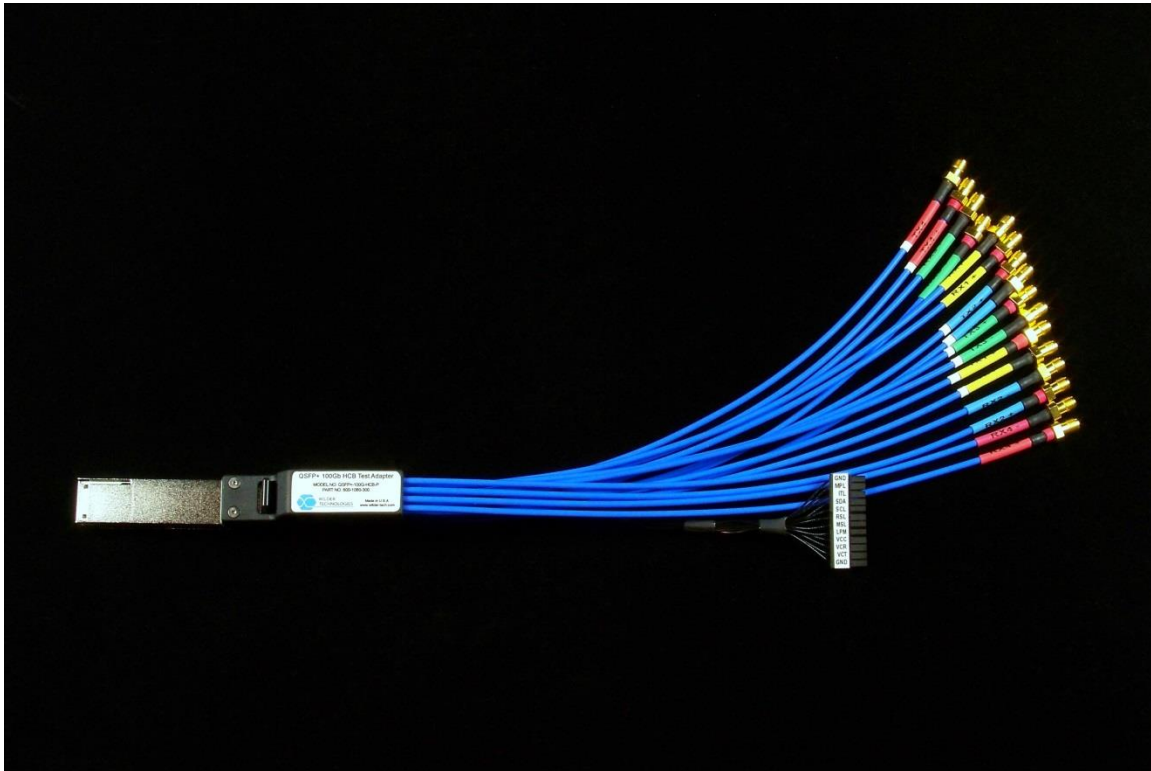
### CLE-1000-S2

1. <http://www.aceunitech.com/index.html>
2. [http://www.aceunitech.com/docs/support/cl1000\\_datasheet.pdf](http://www.aceunitech.com/docs/support/cl1000_datasheet.pdf)

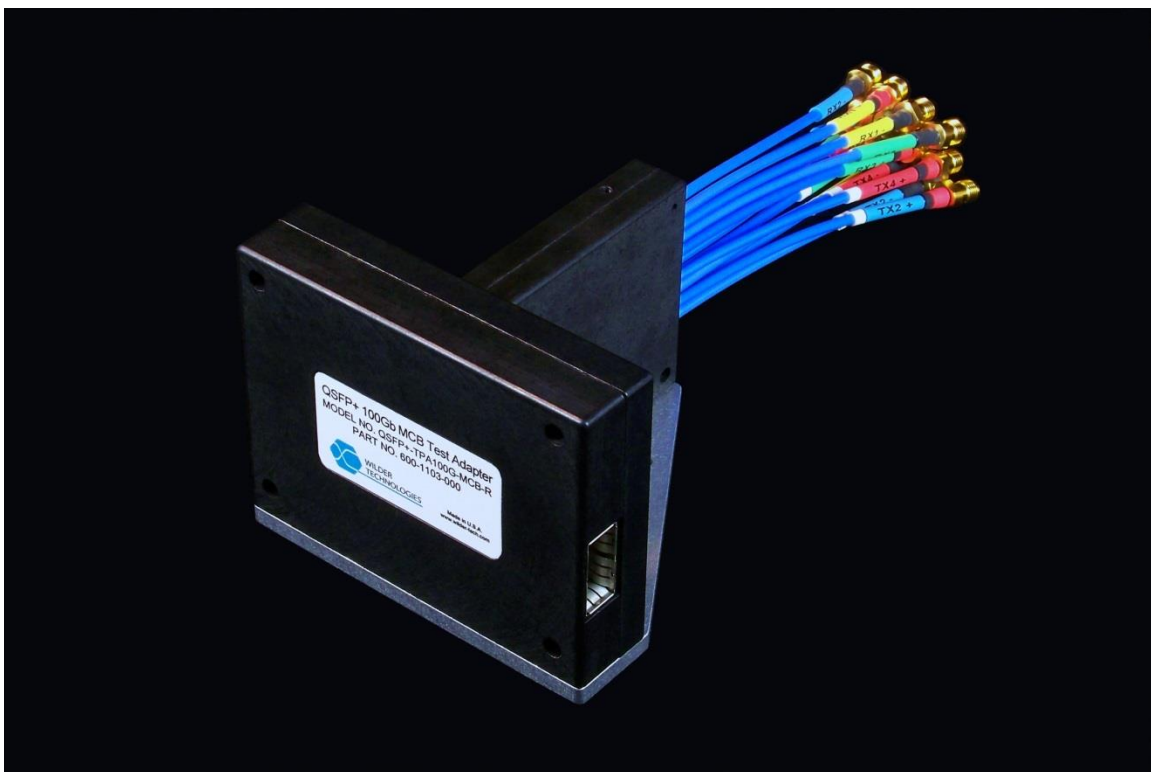


CLE-1000-S2 Front View

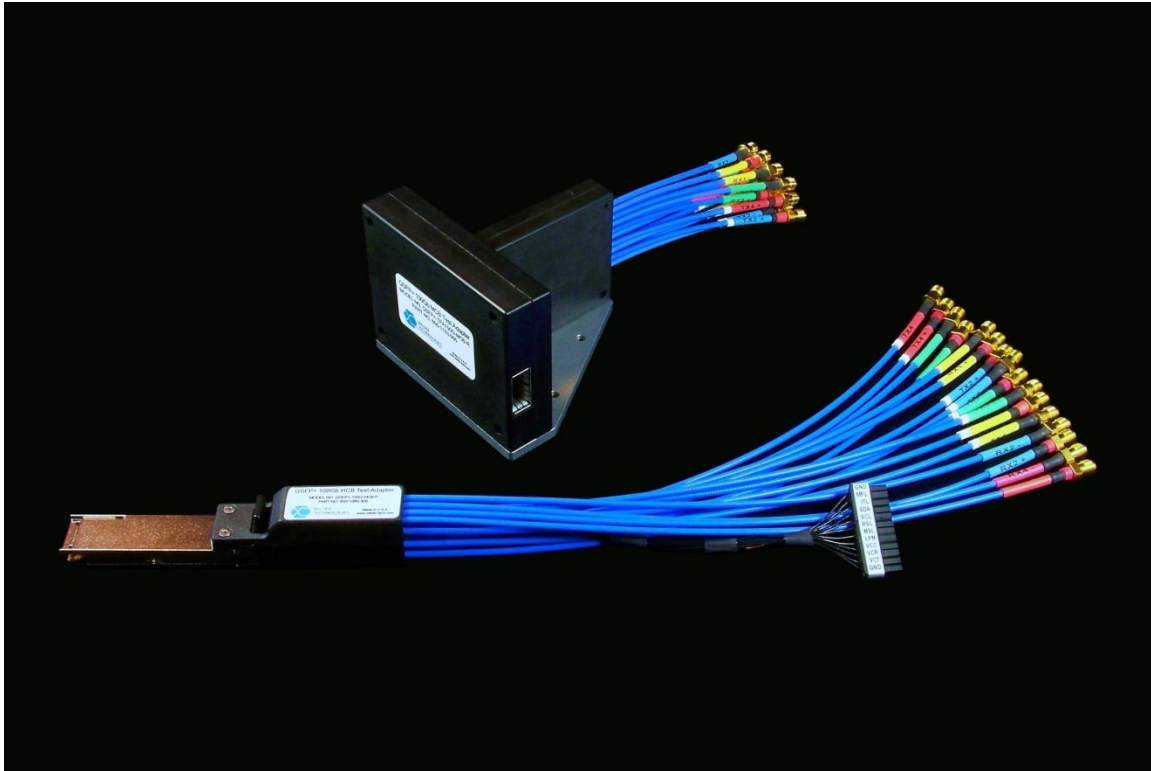
Wilder QSFP+ Test fixture: <http://www.wilder-tech.com/qsfp-plus.htm>



**Wilder Host Compliance Board (HCB)**



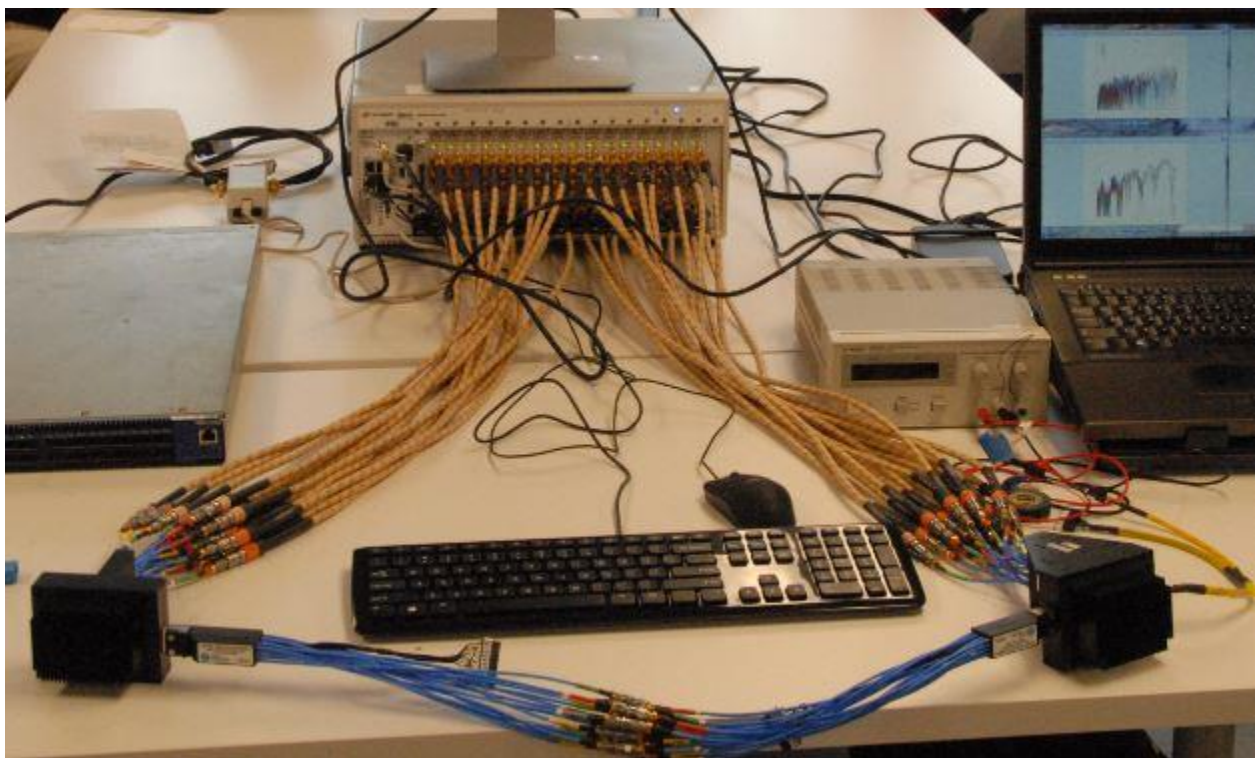
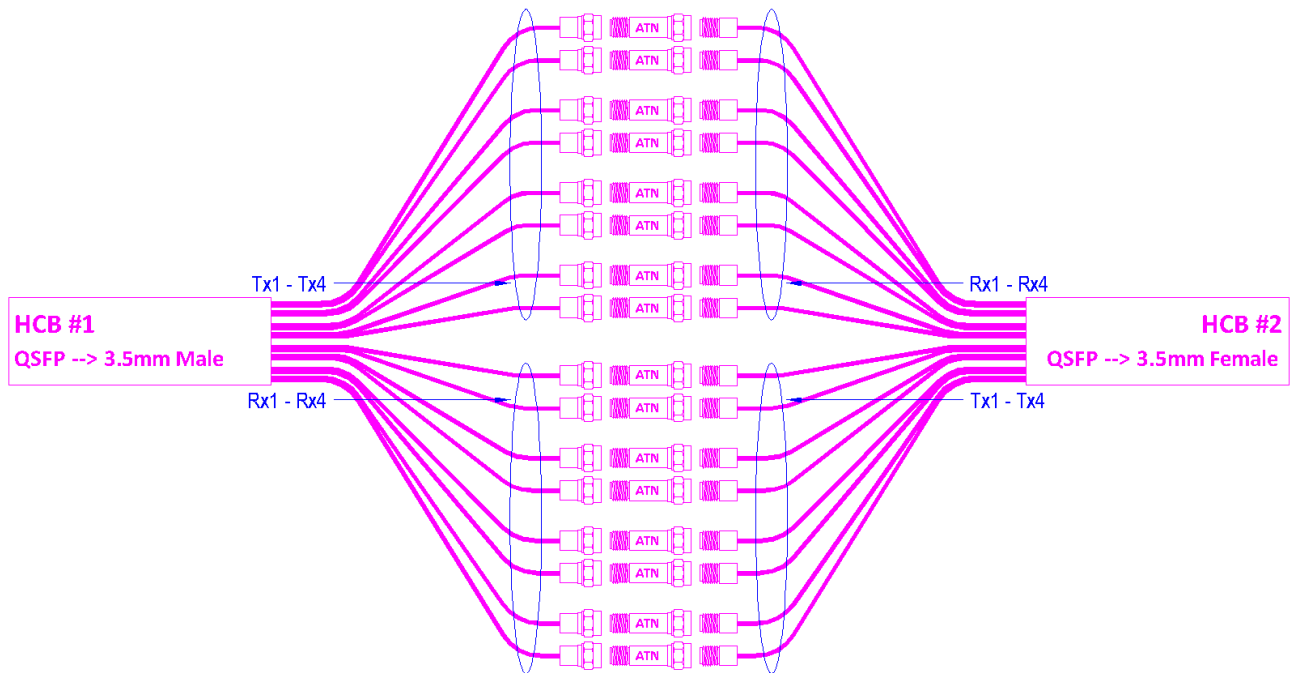
**Wilder Module Compliance Board (MCB)**



## IBTA Applications:

- Wilder HCB
  - QDR, FDR, EDR and HDR device physical layer testing
  - QDR, FDR, EDR and HDR Active Cable Time Domain testing
- Wilder MCB
  - QDR, FDR, EDR and HDR Active Cable Time Domain testing
  - QDR, FDR, EDR and HDR VNA testing

## Wilder Dual Headed HCBs for VNA MCB verification



### IBTA Application:

- Wilder Dual HCBs with 10 dB Attenuators used for VNA fixture validation



## Physical layer Test Equipment Methods of Implementation ([MOI](#))

### IBTA Active Time Domain (ATD) Testing for **FDR** Cables

- [Anritsu ATD MOI for Active FDR Cables](#)
- [Tektronix ATD MOI for FDR Active Cables](#)

### IBTA Active Time Domain (ATD) Testing for **EDR** Cables

- [Anritsu ATD MOI for Active EDR Cables](#)
- [Tektronix ATD MOI for Active EDR Cables](#)

### IBTA VNA Testing for FDR and EDR Cables

- [Keysight 4 Port VNA Testing](#)
- [Keysight 32 Port VNA Testing](#)

### IBTA Testing for FDR Devices (HCAs and Switches)

- [Agilent Transmitter MOI](#)
- [Agilent-Tektronix Receiver MOI](#)
- [Agilent-Anritsu Receiver MOI](#)

## Protocol Layer Test Equipment used in the IBTA Plugfests

### InfiniBand Protocol Analyzers

- LeCroy IBTracer 4x - SDR
  - <http://www.lecroy.com/protocolanalyzer/protocoloverview.aspx?seriesid=128>
- Mellanox ibdump used with Wireshark
  - [http://www.mellanox.com/page/products\\_dyn?product\\_family=110&mtag=monitoring\\_debug](http://www.mellanox.com/page/products_dyn?product_family=110&mtag=monitoring_debug)
  - <http://www.wireshark.com/>

### Software Tools to test Systems and interconnects

- Software Forge [EEPROM Memory Map](#) test suite
- Software Forge [Cable Interoperability](#) test suite
- Software Forge [Compliance Test Suite \(CTS\)](#)
  - a) IB Protocol Layer Tester
  - b) RoCE Transport Tester

### Compliance & Interoperability Testing - IBTA Integrators List

- [http://www.infinibandta.org/content/pages.php?pg=integrators\\_list\\_overview](http://www.infinibandta.org/content/pages.php?pg=integrators_list_overview)
- This site includes a list of all the devices and cables that have passed both the Physical and Protocol Layer testing from June 2003 through October 2017.

## Information about the InfiniBand Trade Association (IBTA)

- **Main IBTA Website Link:**
  - <http://www.infinibandta.org/>
- **Membership Link:**
  - [http://www.infinibandta.org/content/pages.php?pg=about\\_us\\_membership#members](http://www.infinibandta.org/content/pages.php?pg=about_us_membership#members)
  - [http://www.infinibandta.org/content/pages.php?pg=about\\_us\\_list](http://www.infinibandta.org/content/pages.php?pg=about_us_list)
- **Presentations, Events and Information:**
  - [http://www.infinibandta.org/content/pages.php?pg=technology\\_faq](http://www.infinibandta.org/content/pages.php?pg=technology_faq)
  - [http://www.infinibandta.org/content/pages.php?pg=resources\\_presentations](http://www.infinibandta.org/content/pages.php?pg=resources_presentations)
  - [http://www.infinibandta.org/content/pages.php?pg=events\\_past](http://www.infinibandta.org/content/pages.php?pg=events_past)
- **IBTA Specifications:**
  - [http://www.infinibandta.org/content/pages.php?pg=technology\\_download](http://www.infinibandta.org/content/pages.php?pg=technology_download)
  - Volume 1 – this is the protocol layer spec that covers from Layer 3 and up.
  - Volume 2 – this covers Layers 1-2. The updated draft includes all the specs for FDR.
  - Volume 3 – this is the test specification. There are many more test documents that are only available to the Compliance and Interoperability Working Group Members (CIWG)
  - Annex A 16: RoCE
  - Annex A 17: RoCEv2
  - Annex A 18: Virtualization
- **IBTA Working Groups**
  - Compliance and Interoperability Working Group
  - ElectroMechanical Working Group
  - Link Working Group
  - Management Working Group
  - Marketing Working Group
  - Software Working Group
  - Steering Committee
  - Technical Working Group
- **IBTA Roadmap:**
  - [http://www.infinibandta.org/content/pages.php?pg=technology\\_overview](http://www.infinibandta.org/content/pages.php?pg=technology_overview)
- **IBTA Integrators' List Program:** (some links require membership)
  - Integrators' List
    - [http://www.infinibandta.org/content/pages.php?pg=integrators\\_list\\_overview](http://www.infinibandta.org/content/pages.php?pg=integrators_list_overview)
  - IL Policy
    - <https://cw.infinibandta.org/wg/CIWG/document/8162>
  - Plugfest Information:
    - [http://infinibandta.org/content/pages.php?pg=events\\_plugfest](http://infinibandta.org/content/pages.php?pg=events_plugfest)
- **Test Methods of Implementation**
  - [http://infinibandta.org/content/pages.php?pg=technology\\_methods\\_of\\_implementation](http://infinibandta.org/content/pages.php?pg=technology_methods_of_implementation)
- **IBTA Site Map**
  - [http://www.infinibandta.org/content/pages.php?pg=site\\_map](http://www.infinibandta.org/content/pages.php?pg=site_map)