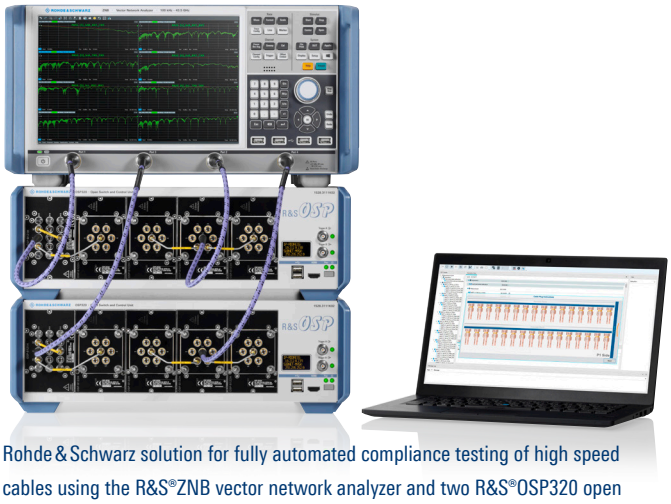
AUTOMATED COMPLIANCE TEST SOLUTION FOR HIGH SPEED ETHERNET CABLES

Ensures compliance of IEEE 802.3bj/by/cd/ck cables with fast automation and easy testing.



Rohde&Schwarz solution for fully automated compliance testing of high speed cables using the R&S®ZNB vector network analyzer and two R&S®OSP320 open switch and control units controlled by the R&S®ZNrun software suite.

Your task

Testing high speed cables for data centers or consumer electronics is a highly complex task that requires precision, support for higher frequencies and a multiport setup. Conventional manual testing with a 4-port vector network analyzer is a time consuming task and can be prone to human error. High speed cables are constructed of numerous copper wires organized as differential signal paths, commonly referred to as "lanes". The number of lanes dictates the maximum transfer rate supported by the high speed cable. For example, the latest IEEE Ethernet PHY specification, IEEE 802.3ck, supports single lane data rates of 100 Gbps. This allows data rates of up to 800 Gbps in a high speed Ethernet cable in the QSFP-DD form factor with 8 lanes.

As the number of lanes in the cable under test increases, the task of testing for compliance to the IEEE 802.3 standard becomes more tedious, complex, and time consuming. This is mainly due to the increased number of reconnections when using a 4-port VNA.

Verifying compliance with the standard requires testing the transmission of each lane (through), as well as TX to RX crosstalk of all neighboring lanes – near end crosstalk (NEXT) and far end crosstalk (FEXT). To measure all S-parameters, a design or test engineer using a conventional setup with a 4-port VNA needs to reconnect the ports to the cable several times to complete the testing of a single cable. Compliance testing can take a full day for each cable, as is the case for 8 lanes.

Rohde&Schwarz solution

Rohde&Schwarz has introduced a fully automated compliance test solution, based on the R&S®ZNrun vector network analyzer test automation suite. It allows easy, precise and time-saving standards-compliance testing for high speed cables.

The compliance test software automatically performs all of the required measurement steps, and it post-processes all of the measurement data according to the standard specifications: channel operation margin (COM) and effective return loss (ERL). It automatically generates a comprehensive test report, including the overall pass/fail verdict. The software suite makes it easy for users to analyze the test results and validate the cable under test, saving a tremendous amount of time while minimizing human error.

The automated Rohde&Schwarz compliance test solution for high speed Ethernet cable assemblies combines the precision and high performance of Rohde&Schwarz vector network analyzers with the flexible R&S®OSP open switch and control platform and the R&S®ZNrun software suite to make measurement faster, easier, and more reliable.

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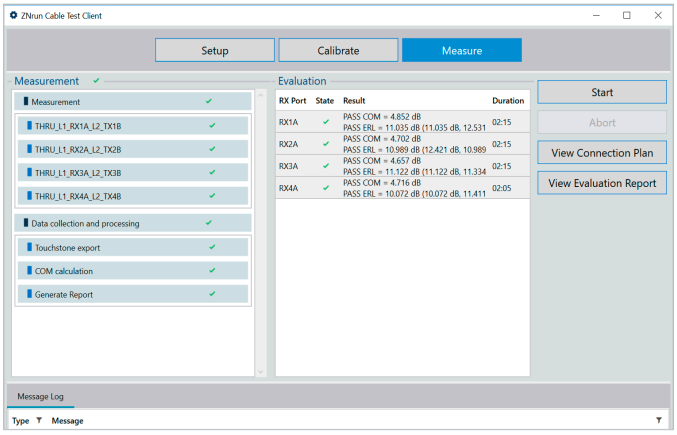
Make ideas real

Fully automated multiport VNA measurements made easy and time efficient

R&S®ZNrun with the R&S®ZNRUN-K4xx compliance test automation options offers a straightforward test procedure, using three simple steps: setup, calibrate, and measure. Each automated step is optimized for minimum calibration and measurement time. Smart cable handling eliminates the need for tedious port reconnections in the test setup. By automating data collection and results processing, the R&S®ZNRUN-K4xx compliance test automation options provide reproducible results and significant time savings.

Beyond compliance: software capabilities offering more than just compliance tests

Apart from fully automated compliance tests, R&S®ZNrun adapts flexibly to a range of testing needs. Designers and test engineers can use the R&S®ZNrun software suite to debug setups and cables. Measurement steps can be deselected – e.g. to perform a fast test for an initial evaluation of the cable. Users can set measurement parameters such as frequency range or sweep time to custom values in order to perform initial plausibility measurements before starting a full compliance test.



Compliance measurements on high speed cables made easy with R&S®ZNrun in just three steps: setup – calibrate – measure. The R&S®ZNrun also controls performance of the test steps, lists the actions to be taken for each step (above left) and shows the current results (above center).

Recommended configurations

	Compliance test for IEEE 802.3bj/by/cd	Compliance test for IEEE 802.3ck
Software		
R&S®ZNrun option	R&S®ZNRUN-K410	R&S®ZNRUN-K411
R&S®ZNrun core software	R&S®ZNRUN-K1	R&S®ZNRUN-K1
License dongle	R&S®ZNPC	R&S®ZNPC
Hardware		
Vector network analyzer	R&S®ZNB26	R&S®ZNA50
Calibration unit	R&S®ZN-Z53 or R&S®ZN-Z54	R&S®ZN-Z55 or R&S®ZN-Z156 (model .03)
R&S®OSP open switch and control platform		
48 ports	2 × R&S®OSP320, 2 × R&S®OSP-B121H and 8 × R&S®OSP-B122H, 1 × R&S®ZV-Z40CR8 [1]	2 × R&S®OSP320, 2 × R&S®OSP-B121U and 8 × R&S®OSP-B122U, 1 × R&S®ZV-Z50CR8 [1]
24 ports	2 × R&S®OSP320, 2 × R&S®OSP-B121H and 4 × R&S®OSP-B122H, 1 × R&S®ZV-Z40CR4 [1]	2 × R&S®OSP320, 2 × R&S®OSP-B121U and 4 × R&S®OSP-B122U, 1 × R&S®ZV-Z50CR4 [1]
8 ports	1 × R&S®OSP320, 2 × R&S®OSP-B121H	1 × R&S®OSP320, 2 × R&S®OSP-B121U

[1] Cable set used for interconnection between R&S®OSP RF switch modules.

Selection tip – types of cable under test and recommended R&S®OSP open switch and control platform

Cable under test		R&S®OSP
Form factor	**Number of lanes**	**Number of ports**
QSFP-DD to QSFP-DD, QSFP to QSFP	8 × TX/RX (CR8)	48
QSFP to QSFP	4 × TX/RX (CR4)	24
SFP to SFP	1 × TX/RX (CR1)	8

Recommended R&S®OSP open switch and control platform for 48, 24 and 8 ports

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Automated compliance test solution for high speed Ethernet cables
Data without tolerance limits is not binding | Subject to change
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