Various Optical Modulation formats in one set

Transmission Test Equipment

40G SONET/SDH and
43/44G OTN

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40G Transport Analyzer

Built for 40G Next Generation Networks, the NX4000 is designed to measure the transmission and reception of communication frames, alarm/error characteristics, and the transmission characteristics, such as the transmission delay time, of 40 Gbit/s SONET/SDH/OTN networks. The NX4000 supports multiple optical modulators and wavelength tunable transponders providing measurement solutions tailored to the needs of customers. In addition, the NX4000 can also be used to measure non-frame signals.

Main Measurement Functions

- Various alarm and error measurements
  Alarms and errors are generated in a variety of modes for SONET/SDH/OTN frames. For alarm and error measurements, status and measurement results are displayed.
- Bit error (BER) measurement
  Bit errors in the payload and non-frame bit errors at 40/43/44 Gbit/s can be measured in addition to the parity errors in the overhead.
- Delay time measurement
  A transmission delay time from the signal transmission through the DUT to the return can be measured at a resolution of 0.1 µsec.
- Multiple measurements
  Not only OTN frames but also mapped multiple channels can be measured at the same time.

EDITING and MONITORING

Editing and Monitoring Function

- Frame editing
  The overhead of the SONET/SDH frame and OTN frame can be freely edited.
- Frame monitoring
  The overhead and payload of the SONET/SDH frame and OTN frame can be monitored.
- Trace message
  The trace message of the section (J0) and Path (J1) can be edited, and the trace message in a received frame can be monitored and displayed. Various trace messages of the OTN frame can also be edited and monitored.

EASE of OPERATION

Comfortable Operation

- Stress-free operation
  Reduces the setup time and contributes to a reduction in the turn around time for automated systems.
- Direct operation with touch panel
  The settings can be configured by directly touching the GUI window eliminating the need for a mouse or separate PC.
- Use of a large 10.4-inch display
  Measurement results which include a large amount of information can be effectively displayed. The NX4000 provides the ability for the user to select what information is displayed using four configurable workspaces.

TRANSPORT TEST PERFORMANCE

Usable for Various Modulation Formats

By using a standards based 40 Gbit/s transponder, the NX4000 can easily support various optical modulation formats and wavelengths over short and long distances by replacing interface modules.

- 40 Gbit/s NZ optical interface, (NX4120, single rate)
- 40/43 Gbit/s NZ optical interface, (NX4120, dual rate)
- 43 Gbit/s QPSK optical interface, C-band (planned)
- 43/44 Gbit/s DQPSK optical interface (NX4121, C-band)
- 43/44 Gbit/s DQPSK optical interface (NX4121, L-band)
- 43 Gbit/s ODB optical interface, C-band (planned)
Select Extension Modules Suitable for the Solution

- Each function is configured with functional modules.
- Only necessary modules need to be selected to build the optical system.
- SONET/SDH test system
- System can be upgraded at minimum cost.
- OTN test system
- NX4000 can be upgraded for OTN testing by adding a single module.
- Optical modulation formats
- Only optical interface modules need to be replaced to use the unit for various optical modulation formats.

Full Mapping

Mapping Function

- SONET/SDH frame
  Mapping from STS-1/VC3 to STS-768c/VC4-256c is supported.
- OTN frame
  Mapping of 40 Gbit/s SONET/SDH and 4-channel 10 Gbit/s SONET/SDH to 43 Gbit/s OTU-3, as well as mapping of 10 Gbit/s OTU-3 to 44 Gbit/s OTU-3 is possible.
- Offset variable
  Independent offset variable frequencies can be used for client signals.

A Variety of External Interfaces Available

- USB 1.1 interface

USB Interface & Setup Function

- USB 1.1 memory
  Two USB 1.1 compliant interface ports are standard components, which can be used for the USB flash memory, mouse and keyboard.
- Setup function
  Setup information of a measuring instrument can be saved and loaded. Settings of multiple measuring instruments can be configured to the same conditions via the external memory.

Intuitive Easy Operation

- Quick key response
- Large touch panel display
- Intuitive operation
- Constant display of receive status
**40 Gbit/s Transponder Test**

- Bit rate: 39.81 Gbit/s, 43.02 Gbit/s, 44.57 Gbit/s
- Frequency Offset: ±30 ppm
- Non-Frame BERT: PRBS31-PRBS7
- Frame BERT: SDH (Payload pattern: PRBS, Programmable)
- OTN (Payload pattern: PRBS)
- Trigger Output for Eye Diagram: 1/16 or 1/64 of Line rate
- REF CLOCK Output: 1/64
- FEC Test Function (OTN Mode)

**43 Gbit/s OTN Test**

- Optical IF: NRZ, DQPSK, (Duo-Binary, DPSK)
- Line rate Offset: ±50 ppm
- OH, Error/Alarm Test
- CBR 40 G/CBR 10 G (OTN mode)
- FEC ERROR Test (OTN mode)

**40 Gbit/s SONET/SDH Test**

- Line rate Offset: ±50 ppm
- Mapping
  - SONET: STS-1, STS-3c, STS-12c, STS-48c, STS-192c, STS-768c
  - SDH: V3c, V4c, V4c-4c, V4c-16c, V4c-64c, V4c-256c
- OH, Error/Alarm, Pointer Justification Test
- APS Test: Test Period Max. 2000 ms, Time Resolution 0.1 ms
- OH BERT: 1 Octet, D1-D3, D4-D12 of SDH/OTN/POH

**Ethernet Over OTN Test**

- Bit rate: 44.57 Gbits
- 10 G-LANPHY Direct Mapping
- Client Rate Offset: ±100 ppm, Each of the four channels independently
- Packet BERT: (Bit error rate test)
- OH, Error/Alarm
- Trigger Output for Eye Diagram:

**40 Gbit/s SONET/SDH to OTN Through Test**

- Optical IF: NRZ, DQPSK, (Duo-Binary, DPSK)
- Line rate Offset: ±50 ppm
- Through-mode OH monitor, OH overwrite = Error insert
- Transparent Loop-back
### Delay Time Measurement Function

- **Delay time measurement**
- **Measurement range:** 0.1 μs to 10 s
- **Resolution:** 0.1 μs
- **Monitor**
  - CRC error and measurement timeout status is displayed.
- **Delay time**
  - Measurement results (Current, Maximum, Minimum, and Average) are displayed.
- **Measure Time**
  - Time elapsed since the start of measurement is displayed.

### Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transmission Function</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Operation mode</strong></td>
<td>SONET/STM-1, OC-1/STM-1 9600 kHz</td>
</tr>
<tr>
<td><strong>SINE/WAVE Interf.</strong></td>
<td>9600 kHz</td>
</tr>
<tr>
<td><strong>Carrier frequency</strong></td>
<td>9600 kHz</td>
</tr>
<tr>
<td><strong>Tuning source</strong></td>
<td>Internal</td>
</tr>
<tr>
<td><strong>Response</strong></td>
<td>Internal</td>
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<tr>
<td><strong>Error rate</strong></td>
<td>10^-12, 10^-6, 10^-3</td>
</tr>
<tr>
<td><strong>Ext. sync.</strong></td>
<td>Internal, 1/16 of the optical frame</td>
</tr>
<tr>
<td><strong>Laser</strong></td>
<td>1550 nm, 1550 nm, 1550 nm, 1550 nm, 1550 nm</td>
</tr>
<tr>
<td><strong>FDDI</strong></td>
<td>100 Mbps, 10 Mbps, 10 Mbps, 10 Mbps, 10 Mbps</td>
</tr>
<tr>
<td><strong>BER</strong></td>
<td>10^-12, 10^-6, 10^-3</td>
</tr>
<tr>
<td><strong>Fractional frequency offset</strong></td>
<td>±100 ppm, ±10 ppm, ±10 ppm, ±10 ppm, ±10 ppm</td>
</tr>
<tr>
<td><strong>Timing offset</strong></td>
<td>±100 ppm, ±10 ppm, ±10 ppm, ±10 ppm, ±10 ppm</td>
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<tr>
<td><strong>Sync.</strong></td>
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### Logging Function

- Errors and alarms occurring during measurement are recorded at a resolution of one second to the hard disk in CSV format.
- Results of measured errors and alarms are displayed at the end of measurement.
- A generated log file can be copied to the USB memory and can be viewed on screen.

### Remote Operation

- Remote operation is possible using a LAN connection.
- Connecting to the network enables operation on a PC in the same manner as using the GUI of the unit.
- Also useful when the equipment is located in a separate room from the tester.
Specifications

General specifications

- Dimensions: 426 (W) x 559.3 (D) x 31.5 (H) mm
- Weight: 30 kg
- Operating temperature: 5 to 40 °C
- Humidity: 35 to 85% RH
- Storage temperature: -20 to 60 °C

Power cord

- Input voltage: 100 to 240 V AC
- Input frequency: 50/60 Hz
- Power consumption: 300 W

Accessories (Optional)

- Rack mounting kit
- Accessories (Optional)

Model and Suffix Codes

- Model
- Suffix Codes
- Descriptions

Ordering Information

- Model
- Suffix codes
- Descriptions

Related Products

- Product Name
- Model
- Suffix Codes
- Descriptions

EXT SYNC/SMUX input

- Input frequency: 1.544 MHz, 1.644 MHz, 3.84 MHz, 10.768 MHz
- Input connector: BNC Female
- Input level: 0.8 Vp to 1.8 Vp

10 MHz Clock input

- Input frequency: 10 MHz
- Input level: 0.8 Vp to 1.8 Vp
- Input connector: BNC Female

EXT SYNC (B2B) input

- Input frequency: 1.544 MHz, 3.84 MHz, 10.768 MHz
- Input level: 0.8 Vp to 1.8 Vp
- Input connector: BNC Female

Clock output

- Output frequency: 10 MHz
- Output level: 0.8 Vp to 1.8 Vp
- Output connector: BNC Female

Optical Transport Analyzer

- Model: NX4000
- Type: Transport Analyzer

- Model
- Suffix codes
- Descriptions

- Power cord
- M: 100 to 240 V AC 50/60 Hz
- N: 100 to 240 V AC 50/60 Hz
- F: 220 to 240 V AC 50/60 Hz

- Accessory
- M: rubber mounting kit
- N: rubber mounting kit
- F: rubber mounting kit

- Optional accessories
- Front mount kit
- Side mount kit
- Rack mount kit

- Optical transport analyzer
- NE218
- NE220
- NE2300
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