# Agilent 53000 Series
# Hardware Overview
# Remote Fiber Test Unit

**Meeting the Challenges of the Modern Telecommunications Age**

Technological developments and global economic changes are impacting every aspect of our lives. As with other industries, the telecommunication companies cannot escape unchanged. This puts many new demands on telecommunication companies if they are to survive and grow.

A telecommunication company must ensure that its core business processes operate efficiently and take full advantage of the latest technology. The demand for more complex optical fiber networks and flexible IP-traffic will increase exponentially as the demand for network services grows.

Also, your customers increasingly demand services tailored to their needs.

The optical fiber network must be flexible enough to respond quickly to the changing business conditions and allow gradual improvements towards an overall solutions strategy.

How does your current network system measure up to the challenges ahead? With Agilent 53000 Series - the breakthrough in optical fiber network monitoring - you can:

- Use our new four layer architecture - Information access, Analysis tools, Information structuring, and Automation tools - to create a monitoring system that is tailored to your needs.
- Purchase single point solutions that are addressing specific problems, but they operate as an overall system.
- Integrate and monitor information from other network elements and management systems.
- Do all this from one single workbench. Therefore, the need for training will minimize.
- Reduce the time to repair fiber breaks by about 50%.
- Reduce your operating and maintenance costs.
- Reach a new stage of reliability - with fewer mechanical components and internal connectors, no hard disk, and no backbone.

To summarize the key advantage, you are about to experience a fast return of investment (ROI).

Therefore, Agilent 53000 Series with the Remote Fiber Test Unit (RFTU) as a central component allows you to meet the challenges of the new telecommunications age, to continually adjust its business activities to reflect the constant shifts in market focus.

**The Components of the RFTU**

The Agilent 53000 Series functionality based on open standards is now integrated into a one height-unit device that consists of:

*Optical Time Domain Reflectometer (OTDR)*

You use the OTDR to determine the state of an optical link. To carry out test measurements, the OTDR is equipped with one or two build-in laser sources.

To determine the state of an optical link, the OTDR continuously launches an optical pulse into the link, to measure the energy level of the backscatter that the link creates. The gathered information is displayed as a graph.

*Optical Switch Module*

An optical switch module is a software-controlled optical multiplexer that you must use if you want to automatically monitor more than one optical link.

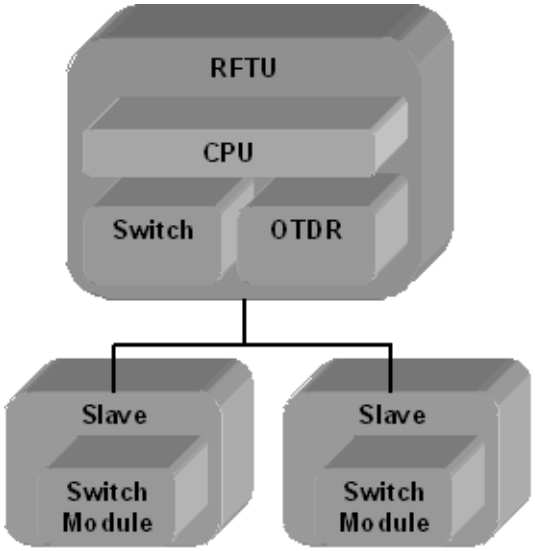
An optical switch module has one input channel for the optical pulses that the Optical Time Domain Reflectometer (OTDR) generates, and

several output channels to which you attach the optical links you want to monitor.

*CPU*
The CPU module is the central control unit for the inter operability between internal components and network-related applications.

Figure 1 gives you an example of the embedded structure of the RFTU.

*Figure 1 - Embedded RFTU Architecture*




You can create an individual Remote Fiber Test Unit, by tailoring it to your needs. The following list will help you to select the components suitable for your network.

| Agilent Product Number N5330*XX*[a] | |
|---|---|
| OTDR | Switch |
| OTDR 1550 Medium | No switch |
| OTDR 1550 High | 4 port switch |
| OTDR 1625 Medium | 8 port switch |
| OTDR 1550/1625 Medium | 16 port switch |
| | 32 port switch |
| | 48 port switch |

a. *XX* denotes the type of OTDR and Switch.

## Technical Specifications of the OTDR Module

*Optical Performance*[1]

| Agilent Product Number | | N5350A*X*[2] | N5350B*X* | N5350C*X* | N5350D*X* | |
|---|---|---|---|---|---|---|
| Central Wavelength [nm]<br>Tolerance | | 1550<br>± 25 | 1550<br>± 25 | 1625<br>± 15 | 1550<br>± 25 | 1625<br>± 15 |
| Attenuation<br>Deadzone | | 12 m | 12 m | 14 m | 12 m | 14 m |
| Event Deadzone[3] | | 3m | | | | |
| Fiber Type[4] | | Single mode | | | | |
| Dynamic Range [dB][5] | | | | | | |
| Pulsewidth | 10 ns | 17 | 22 | 18 | 22 | 18 |
| | 100 ns | 22 | 27 | 24 | 27 | 24 |
| | 1 ms | 29 | 34 | 30 | 34 | 30 |
| | 10 ms | 37 | 41 | 37 | 41 | 37 |
| | 20 ms | 39 | 43 | 40 | 43 | 40 |

*Loss/ Reflectance Accuracy*

| Offset Error | Scale Error | Sampling Error |
|---|---|---|
| ± 1 m | ± $10^{-4}$ | ± 0,5 sampling spacing |

| Horizontal Parameters | |
|---|---|
| Start | 0 to 400 km |
| Span | 0.1 to 400 km |
| Readout Resolution | 0.1 m |
| Min. Sample Spacing | 0.08 m |
| Refractive Index | 1.00000 to 2.00000 |
| Length Unit | km, ft., miles |
| Measurement Points | up to 64000 |

| Vertical Parameters | |
|---|---|
| Vertical Scale | 0.1 to 10.0 dB / Div |
| Readout Resolution | 0.001 dB |
| Backscatter Coefficient | 14 to 70 dB at 1 ms |
| Reflectance Range | -14 to -70 dB |

| General Parameters | |
|---|---|
| Operating Temperature | 0°C to + 55 °C |
| Storage Temperature | -40°C to + 70 °C |
| Humidity | 95% R.H.<br>0 - 40 °C |

| Scan Trace Events | |
|---|---|
| Max. Number | 100 |
| Types | Reflective and non-reflective events |
| Reflective Event Threshold | -14.0 to -65.0 dB and 0.00 dB (disabled) Selectable in 0.1 dB steps |
| Non-Reflective Event Threshold | 0.0 to 5.0 dB Selectable in 0.01 dB steps |
| Fiber Break Threshold | 0.1 to 10 dB and 0.00 (disabled) Selectable in 0.1 dB steps |

## Technical Specifications of the Optical Switch Module

| Product number | Number of Channels |
|---|---|
| N5350*X*B[8] | 4 SC |
| N5350*X*C | 8 SC |
| N5350*X*A | 16 SC |
| N5350*X*E | 32 SC |
| N5350*X*F | 48 SC |

| Optical Specifications | |
|---|---|
| Insertion Loss | 2 dB max., typically 1 dB at 25 °C |
| Return Loss | 40 dB (typical) |
| Life Time | $10^7$ switch cycles, adjacent port to port |
| Isolation | > -80 dB |
| Optical Connector Types | Output SC |

Notes:

[1] Guaranteed specifications measured at 22 °C ± 3 °C.

[2] *X* denotes the type of optical switch module.

[3] Reflectance ≤ -35 dB at 10 ns pulsewidth, and with span ≤ 4 m at 8 cm sampling spacing, optimize resolution.

[4] Typical specification @ Reflectance ≤-50 dB at a pulsewidth of 30 ns, span ≤ 4 km. Guaranteed specification @ Reflectance ≤ -35 dB at a pulsewidth of 30 ns, and with a span of ≤ 4 km. Optimize mode, resolution:
25m @ 1550 nm
28m @ 1625 nm

[5] Measured with a standard single-mode fiber at SNR = 1 noise level and with 3 minutes averaging time. Optimize mode: dynamic.

[6] Distance accuracy: offset error + scale error * distance + sampling error.

[7] SNR ≥ 15 dB and with 1 μs, averaging time maximum 3 minutes.

[8] *X* denotes the type of OTDR.

**Safety Information**
All laser sources specified by this data sheet are classified as class 1M or class 2 according to IEC 60825-1 (2001)

All laser sources comply with FDA 21 CFR 1040.10 except for deviations pursuant to Laser notice No. 50, dated 2001-July-26.

The class 1M laser sources bear the laser label.


You must return malfunctioning laser modules to an Agilent Technologies Service Center for repair and calibration.

**Agilent Technologies Test and Measurement Support, Services, and Assistance**
Agilent Technologies aims to maximize the value you receive. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you to choose the right Agilent product for your application and apply them successfully. Every instrument and system we sell has a global warranty for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage".

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