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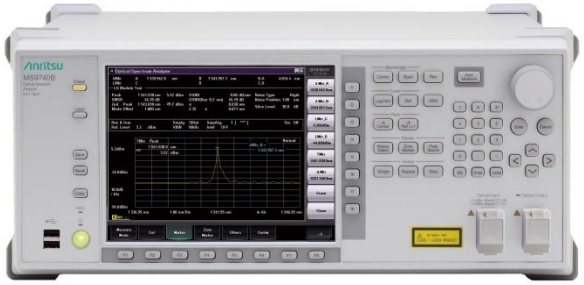
# Optical Spectrum Analyzer
# MS9740B

# Overview

**Reduce the measurement processing times by up to half compared to the earlier model while assuring high performance and complete test menus brings higher-efficiency inspection of active optical devices.**

**Reduce the manufacturing costs is a key issue for makers of active optical devices. Measuring instruments for device evaluation are expected to increase productivity by shortening inspection times.**
**The Optical Spectrum Analyzer MS9740B reduces the total time from waveform sweeping to data transfer to external control equipment and supports simple analysis procedures, offering excellent cost performance and better productivity.**

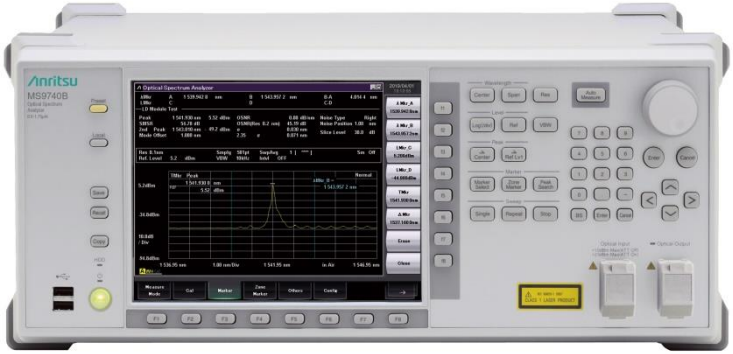


**Optical Spectrum Analyzer MS9740B**

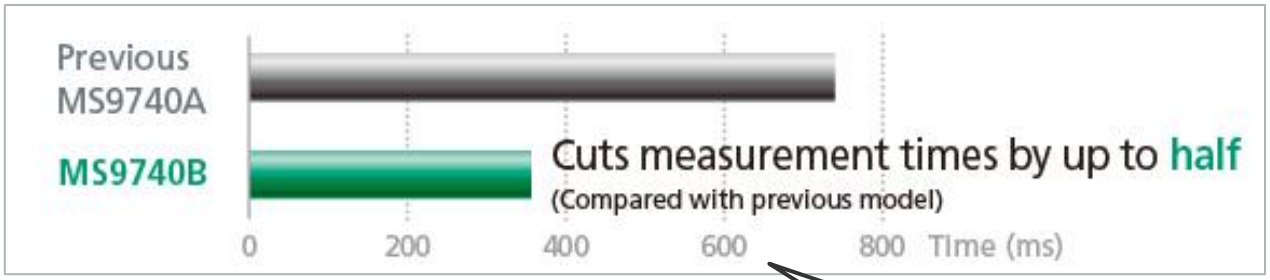
- **Wavelength sweeping time <0.35 s*1**
- **Maximum wavelength sweeping time <0.2 s*2**
- **Dynamic range performance ≥58 dB**
- **30 pm minimum resolution**
- **–90 dBm minimum light-reception sensitivity**
- **Stable productivity at pulse measurement of high-output LDs** ***New !***

*1: Reference value: Reduces sweep time by 50% compared to previous models.
VBW: 1 kHz_Fast, Resolution: 0.1nm, Sweep Width: 30 nm, Sampling Points: 1,001
*2: VBW: 10 kHz, Resolution: 0.1 nm, Sweep Width: 5 nm, Sampling Points: 501

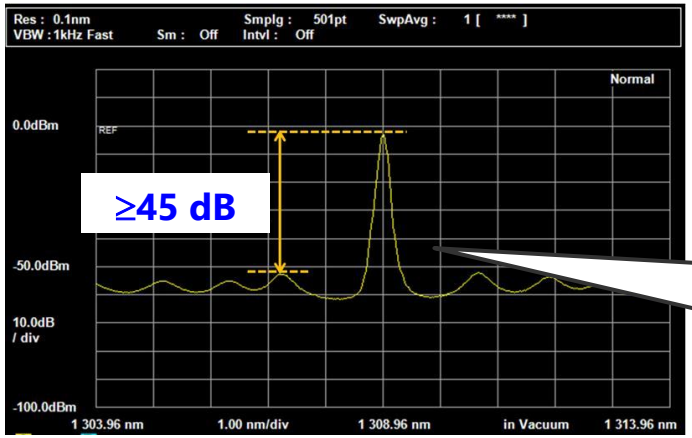
# Key Features (1/3)



- **Reduce the measurement time by 50% for better production efficiency at required active optical device evaluation**




GPIB Interface
SMSR meas. (DFB Light source)
VBW: 1 kHz_Fast (MS9740B)
1 kHz (MS9740A)
Resolution: 0.1 nm
Sweep Width: 30 nm
Sampling Point: 1001

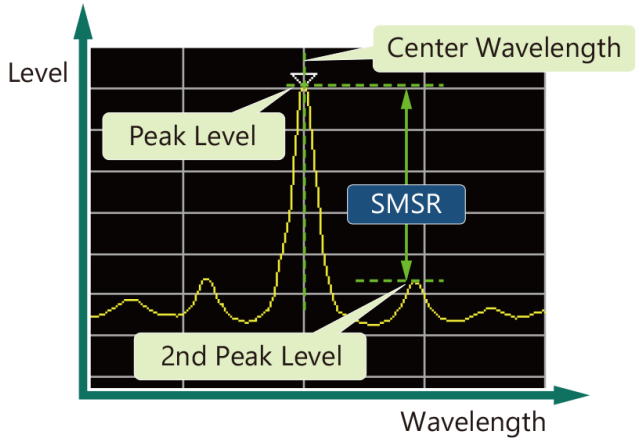



MS9740B is not only maintains **more than 45 dB dynamic range**, but also **supports reduce the measurement time by 50%**, helping improve user productivity even more.

# Key Features (2/3)

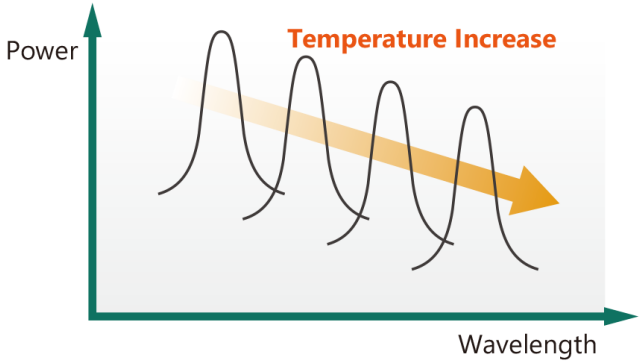
## ■ Stable High-Output LD Productivity *New !*

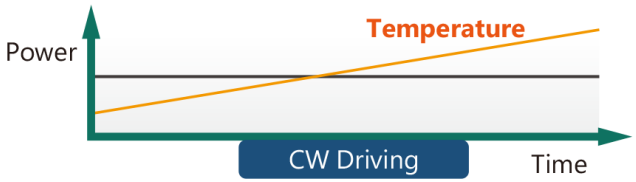
Use of more high-output LDs in fields such as faster and larger-capacity networks, sensing, etc., is increasing demand for optical spectrum evaluation using pulse measurement to ameliorate heat generation.
the MS9740B supports an optical pulse measurement mode that captures the spectrum of optical pulses from the LD asynchronously without trigger signal input in the same measurement time as when measuring a CW optical spectrum.

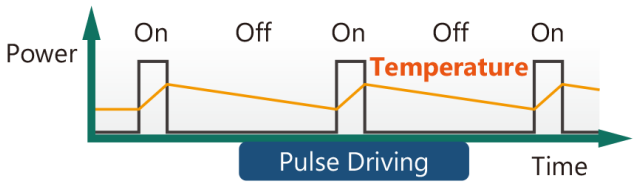



**SMSR repeatability: ±1.4 dB***

*With MS9740B-020 Option, ±1.8 dB (with MS9740B-009)
10 dBm input at Peak Power, DFB-LD, Wavelength 1550 nm, SMSR ≤ 45 dB, No Polarization, SM Fiber,
Pulse conditions: Pulse Oscillation Conditions ≥5 kHz, duty >1%, Pulse Mode on, VBW=1 kHz, RBW= 0.1 nm, span ≤ 10 nm,
Sampling Point 501, 23°C±5°C



# Key Features (3/3)

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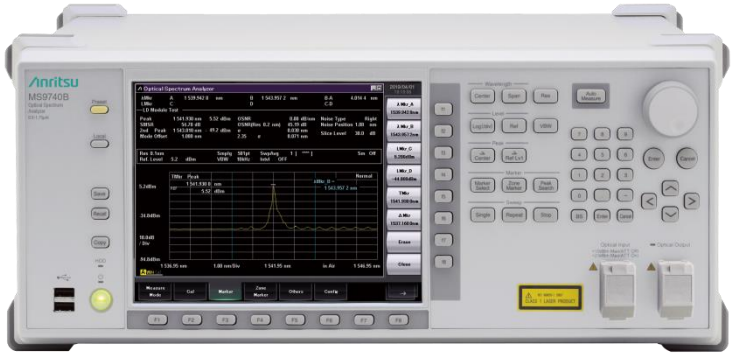
## ➢ Easy Operation:

When a mouse is connected, the familiar Windows GUI makes menu selection and parameter setting an easy and convenient alternative to setting using panel keys.




## ➢ Supports SM and MM Fibers

## ➢ Large 8.4-inch LCD

## ➢ Internal Memory Function:

Up to 1000 files can be saved to internal memory.

## ➢ Full Range of Interfaces:

Supports Ethernet (TCP/IP) and GPIB (option) interfaces

## ➢ Lightweight:

Weighing in at under 15 kg, the MS9740B is the world's lightest benchtop spectrum

# Nine Application Modes

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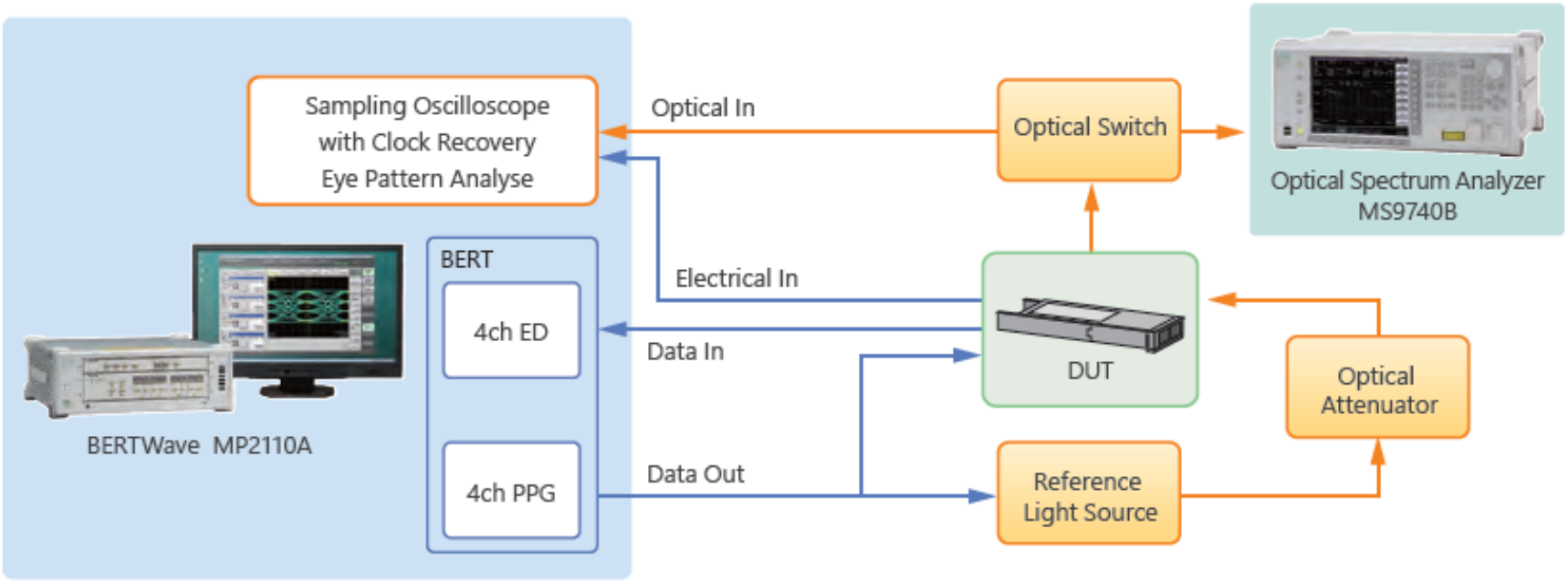
**At evaluation of LD characteristics, analysis items and methods can be tailored to the spectrum, such as a single DFB-LD spectrum, multiple discrete-wavelength FP-LD, wideband LED, etc.**
**The MS9740B has seven modes (DFB-LD, FP-LD, LED, PMD, Opt Amp, Opt Amp (Multi-Channel), WDM, WDM Filter, LD Module) matching the measurement target.**

| **Test Target** | |
|---|---|
| LD Module | Evaluation of optical-transceiver characteristics |
| DFB-LD | Evaluation of single vertical-mode spectrum |
| FP-LD | Evaluation of multiple discrete-wavelength spectrum |
| LED | Evaluation of wideband light source spectrum |
| PMD | Evaluation of PMD characteristics of optical fiber |
| Opt. Amp /<br>Opt. Amp (Multi-Channel) | Evaluation of gain and NF characteristics of fiber amplifier (EDFA) |
| WDM | Evaluation of WDM signal spectrum for up to 300 wavelengths (channels) |
| WDM Filter | Analysis of optical bandpass filter |

# Example of Optical Transceiver Measurement (1/3)




- **Dedicated applications for evaluating active optical devices**
- **Supports SM and MM fibers**

# Example of Optical Transceiver Measurement (2/3)

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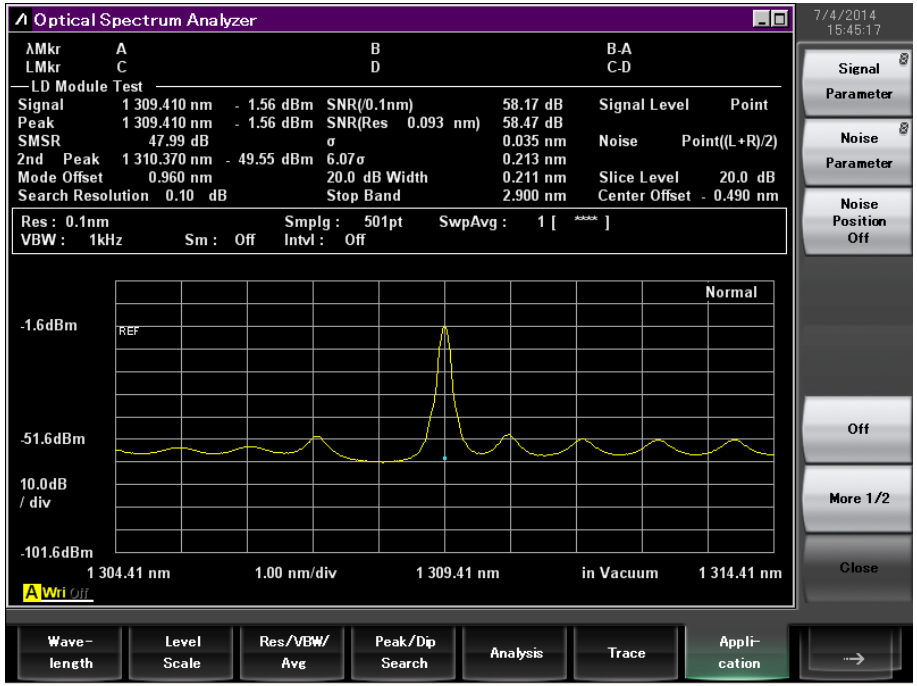
***Displays all analysis results required for active optical device on one screen.***

**This application measures test items, such as center wavelength, optical level, OSNR, etc., required for LD module tests, and displays the results on one screen.**




- **LD-Module Test Items**
  - ✓ **Center wavelength, level**
  - ✓ **OSNR (actual measured value)**
  - ✓ **OSNR (noise level per nm)**
  - ✓ **SMSR**
  - ✓ **Spectrum width**

# Example of Optical Transceiver Measurement (3/3)

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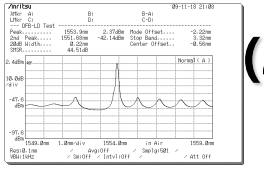
(1) (2) (3)

## Conventional OSA…

(1) **Peak**
**SMSR**
**2nd Peak**
**Mode Offset**



### DFB-LD Mode analysis

Evaluation of single vertical mode spectrum

(2) **OSNR**

### WDM Mode analysis

Analyzes OSNR

*New automatic resolution conversion (dB/nm) function added to MS9740 Series

(3) **σ, 2.35 σ**

### FP-LD Mode analysis

Evaluation of multiple discrete-wavelength spectrum

**Regardless of whether the spectrum is DFB-LD or FP-LD, the MS9740B analyzes basic optical module items on one screen. And it supports batch transmission of these results via remote control.**

# Passive Optical Device Measurement (1/3)

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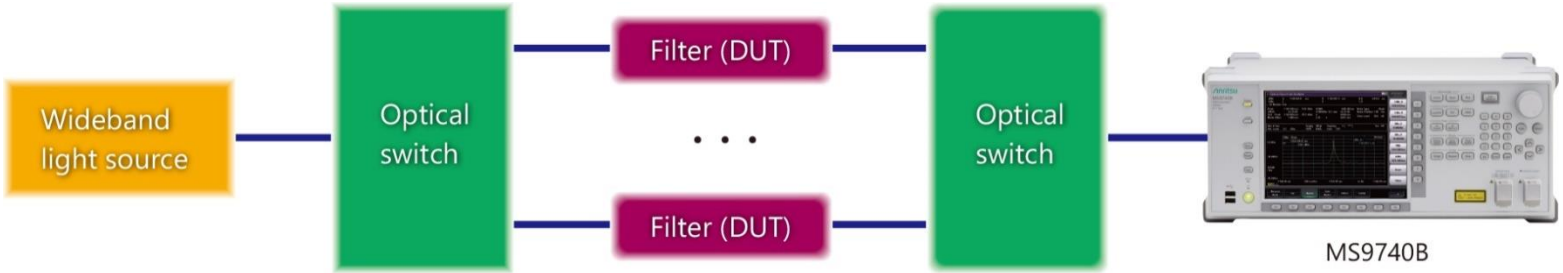
## Wide dynamic range and high-resolution support for passive optical device evaluation




- **Dynamic range performance ≥ 58 dB (±0.4 nm from peak wavelength)**
- **30 pm minimum resolution**
- **–90 dBm minimum light-reception sensitivity**

**The MS9740B supports signal evaluation with wide dynamic range and high-resolution, such as measurement of narrow-band filters and OSNR analysis of WDM signals.**

# Passive Optical Device Measurement (2/3)

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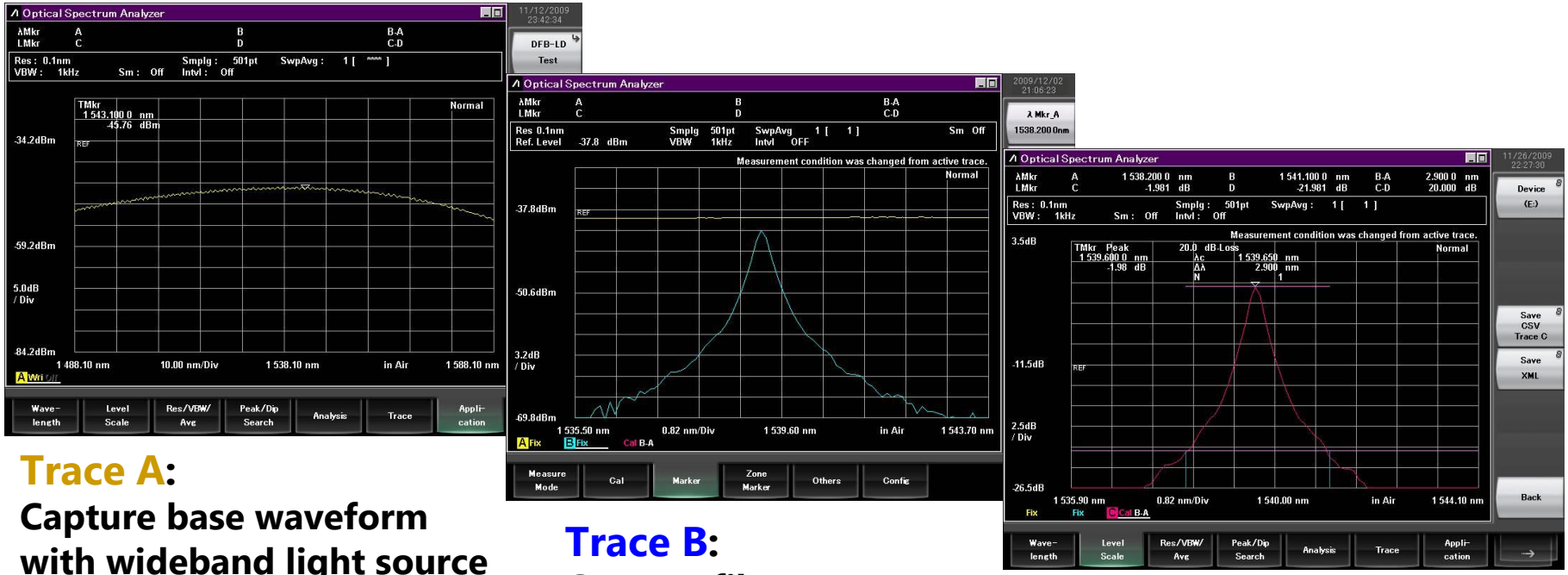
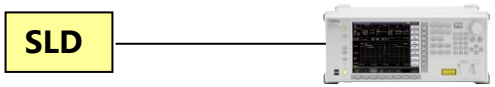
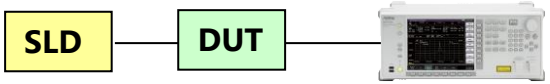
## *OPBF Loss characteristics evaluation*




**Trace A:**
**Capture base waveform with wideband light source**




**Trace B:**
**Capture filter characteristics waveform**




**Trace C:**
**Analyze loss characteristics with Trace A and B difference**

# Passive Optical Device Measurement (3/3)

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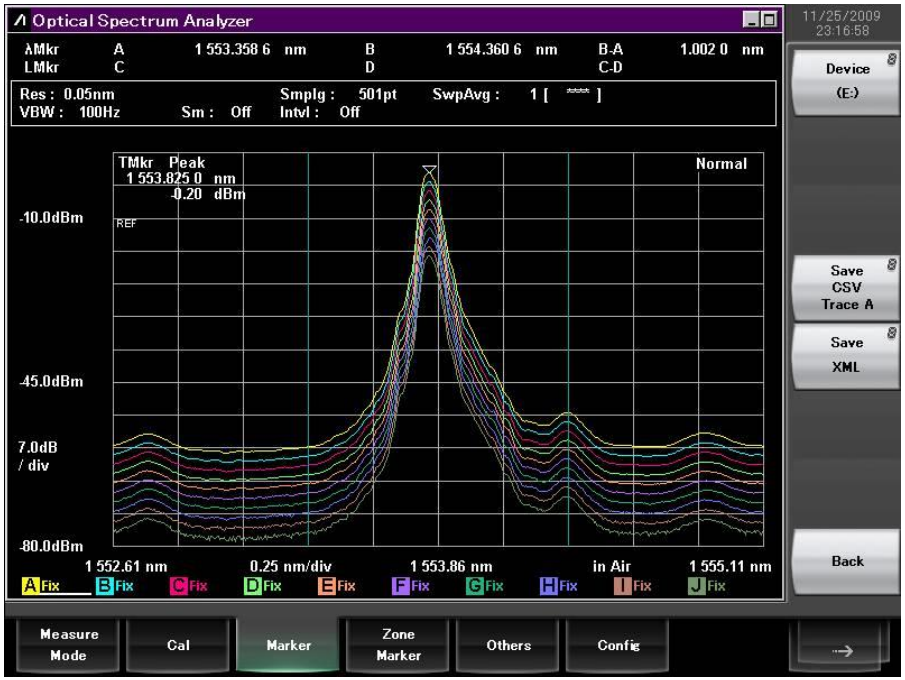
## *Up to 10 waveforms displayed on one screen saved in one file*

**The MS9740B has a large waveform memory for saving up to 10 waveforms and a wavelength difference calculation function, making it easy to evaluate devices such as optical switches.**




- **Display up to 10 waveforms on one screen**
- **Save 10 analyzed waveforms in one file**
- **Save up to 1,000 files to internal memory**

**Save 10,000 waveforms to internal memory**

# Optical Bandpass Filter Measurement Solution (1/2)

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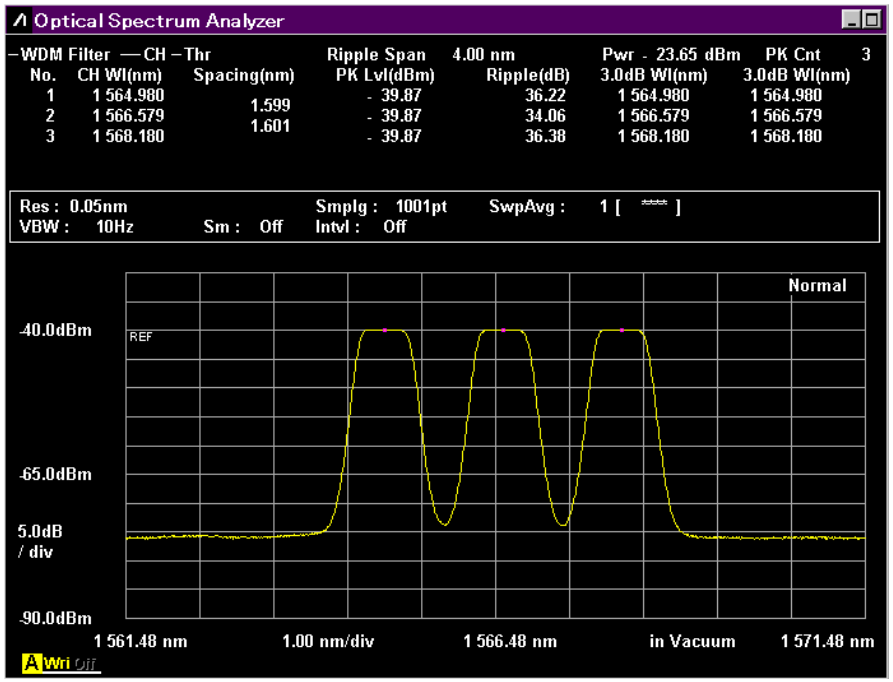
## *Transmittance Evaluation*




## Batch Measurement of Optical Bandpass Filter Transmittance

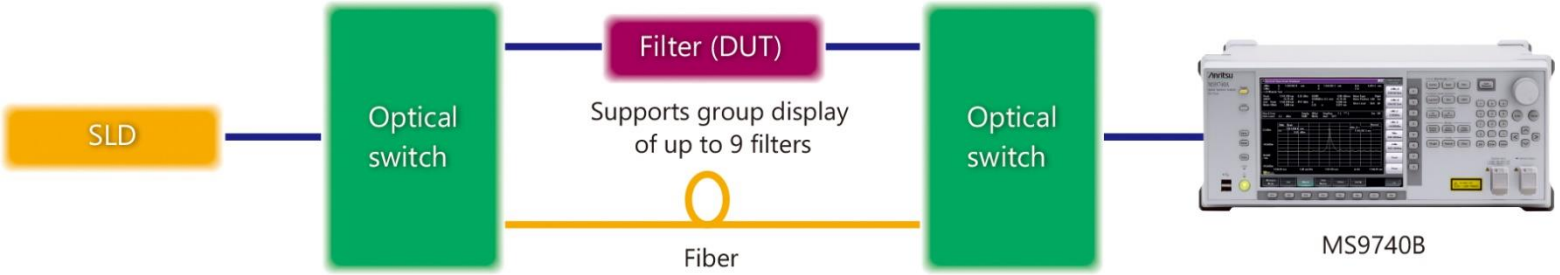
**The WDM Filter analysis function supports efficient evaluation of optical bandpass filter transmittance characteristics**

**WDM Filter Function Measurements**

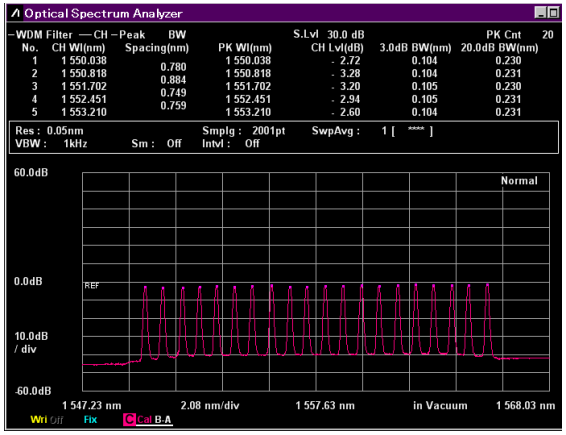
- Signal Level
- Peak Signal No.
- Signal Wavelength
- Spacing (Wavelength)
- Pass Band
- Ripple

# Optical Bandpass Filter Measurement Solution (2/2)

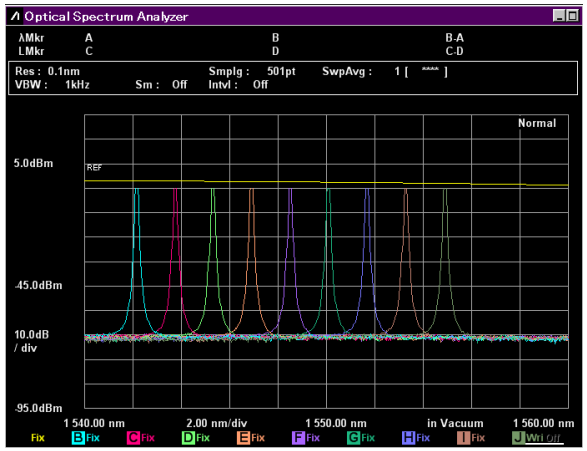
## *Insertion Loss Evaluation*




- **evaluated by finding the difference in the measured results when the filter (DUT) is inserted and not inserted**
- **Filter Insertion Loss Analysis using Trace Mode**




**Filter Analysis by Waveform Difference Comparison**




**Multi-waveform Trace**

# WDM Signal Analysis (1/2)

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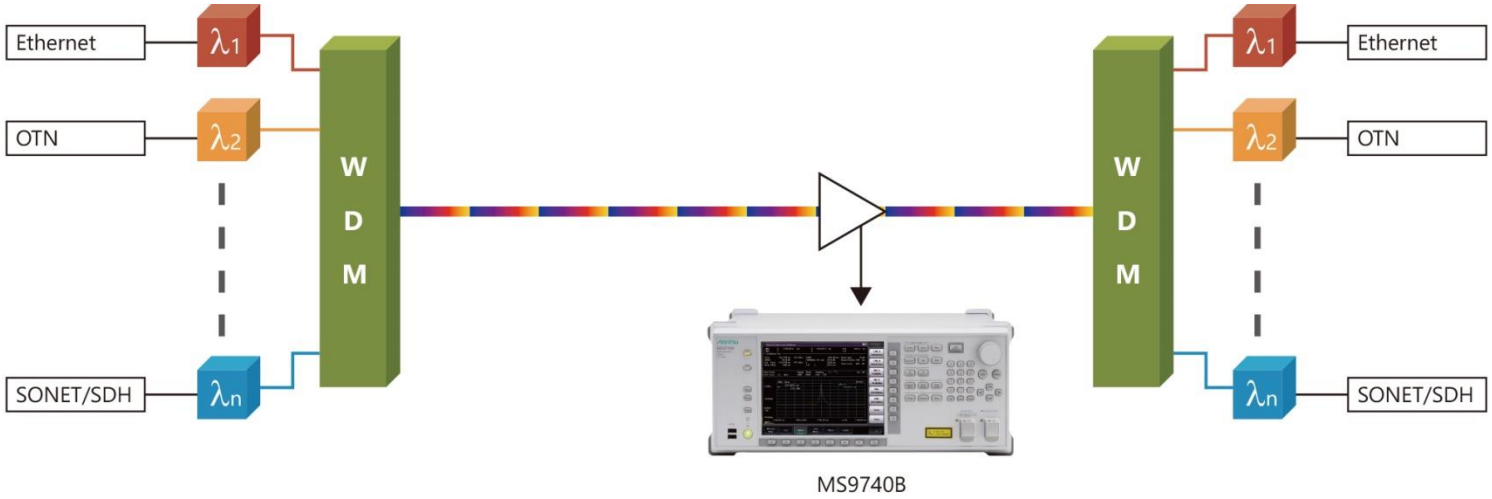
**Wide dynamic range and high-resolution support WDM signal measurements at 100 GHz or 50 GHz intervals with margin**




- **Dynamic range performance ≥58 dB (±0.4 nm from peak wavelength)**
- **30 pm minimum resolution**

# WDM Signal Analysis (2/2)

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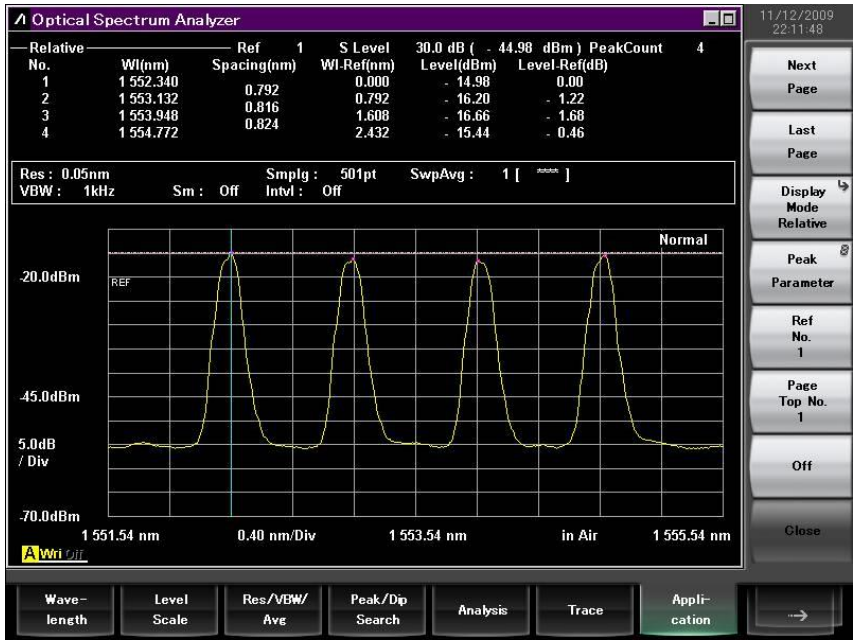
## *Simultaneous spectrum analysis of multiple waveforms*

**Up to 300 channels can be analyzed and information required for WDM signal analysis, such as center wavelength, level, SNR, etc., is displayed on one screen.**




# EDFA Analysis (1/2)

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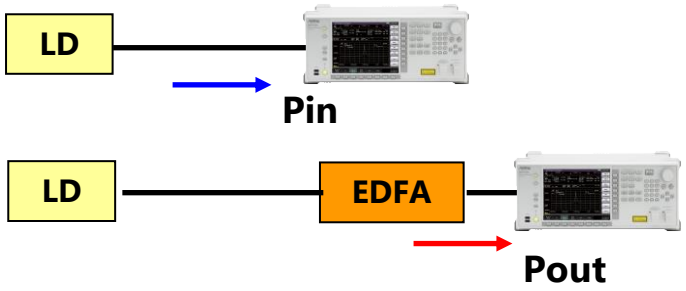
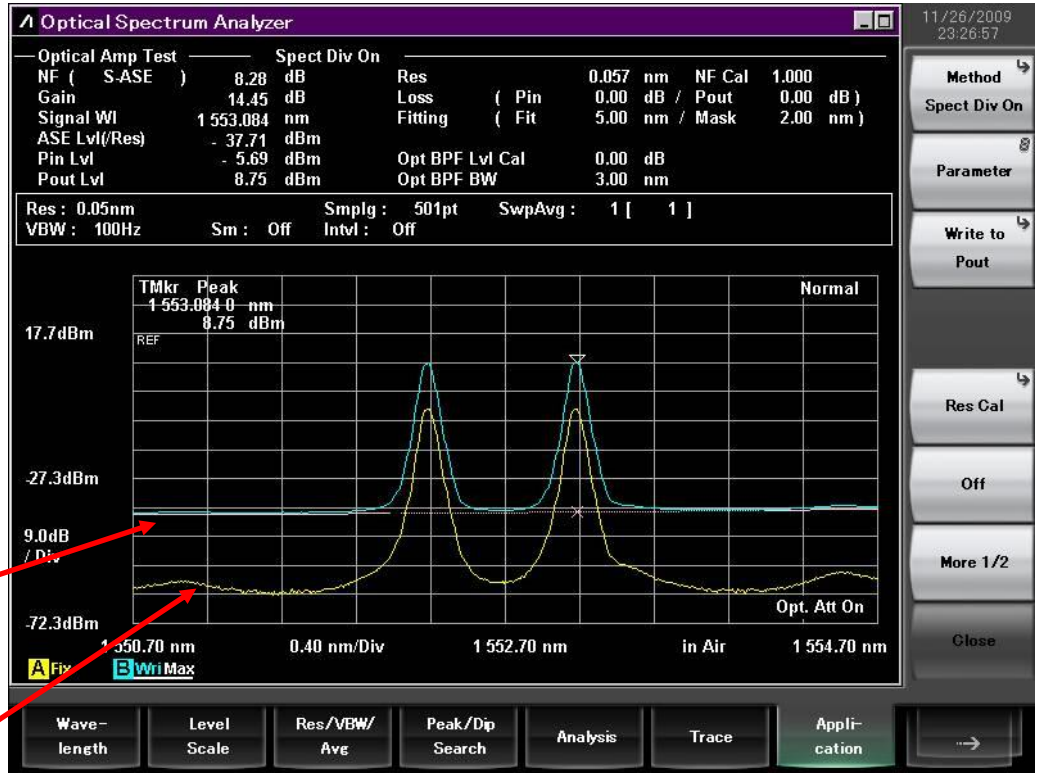
**The MS9740B calculates the gain and NF automatically from the optical input and output to the optical fiber amplifier.**




- Pulse Method
- Spectrum Division Method
- PLZN Nulling Method

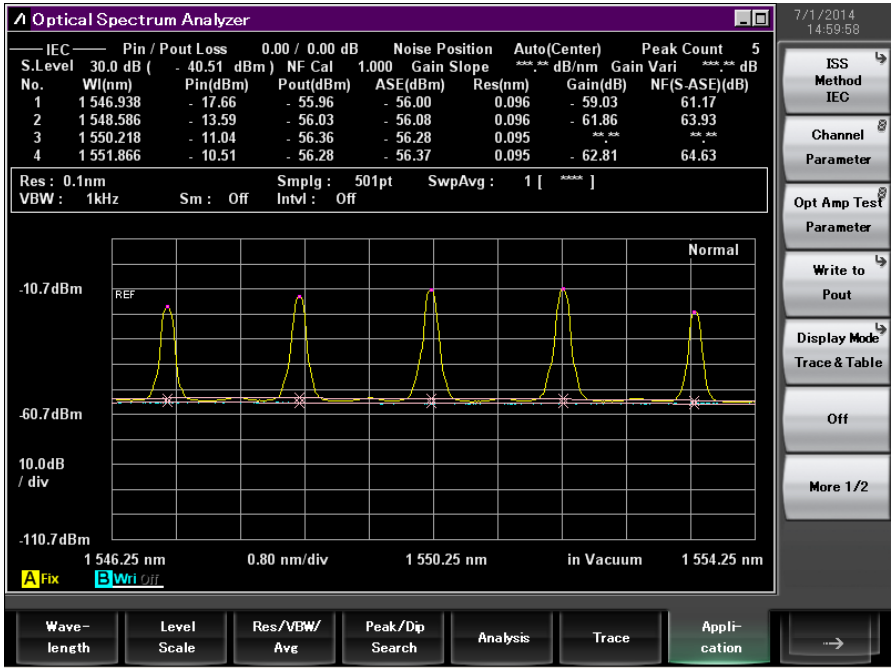
**Pout output waveform after amplification**

**Pin output waveform before amplification**



# EDFA Analysis (2/2)

- Support to Opt. Amp (Multi-channel) for WDM signals and the latest IEC standards.
  - The IEC-recommended ISS (Interpolated Source Subtraction) method is supported for gain and ASE analysis
  - a mode for automatically detecting the noise position is also provided.
  - The Gain Variation and the Output Slope analysis are also supported within the same application.



# Optical Level Variation Evaluation

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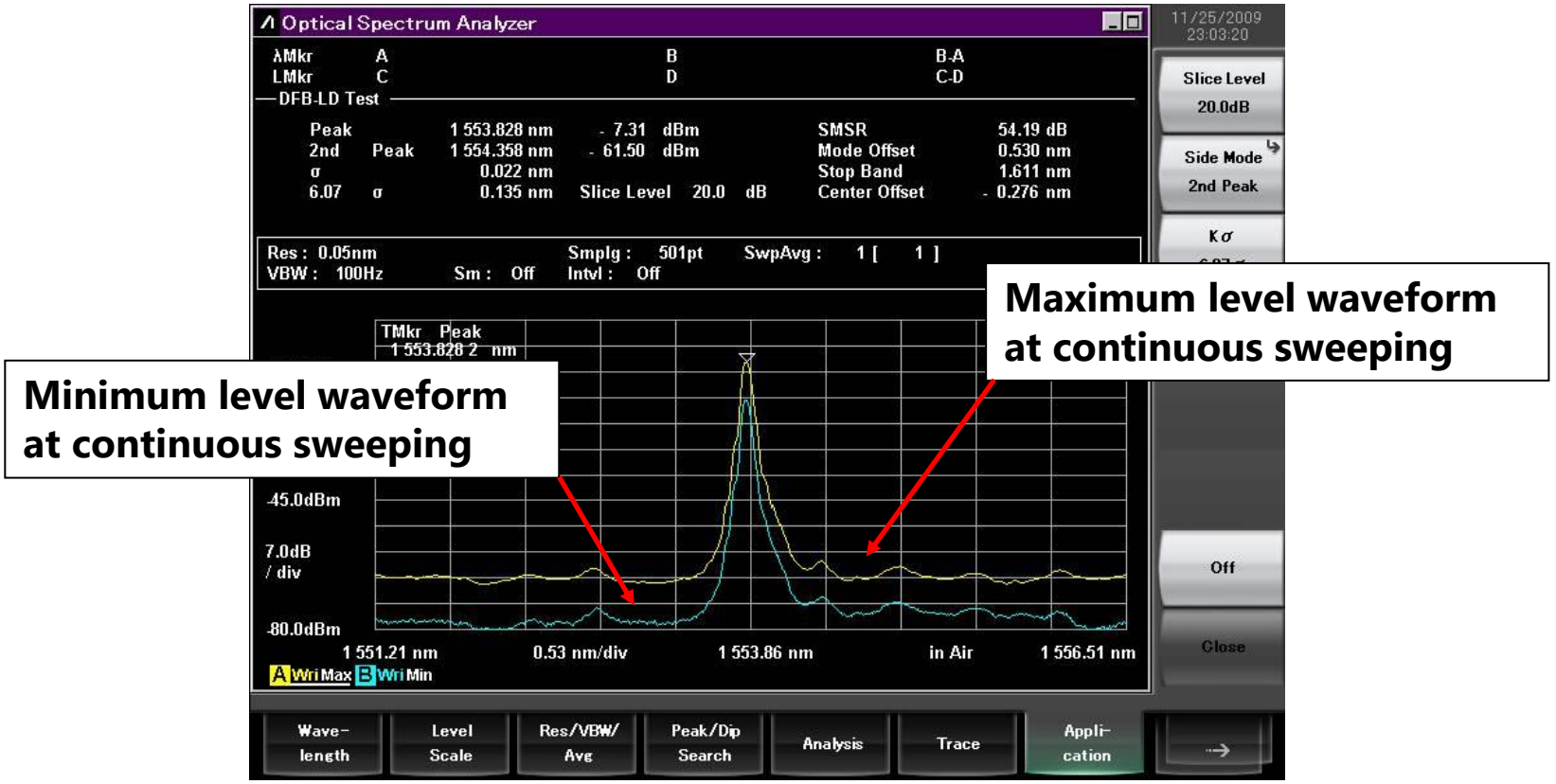
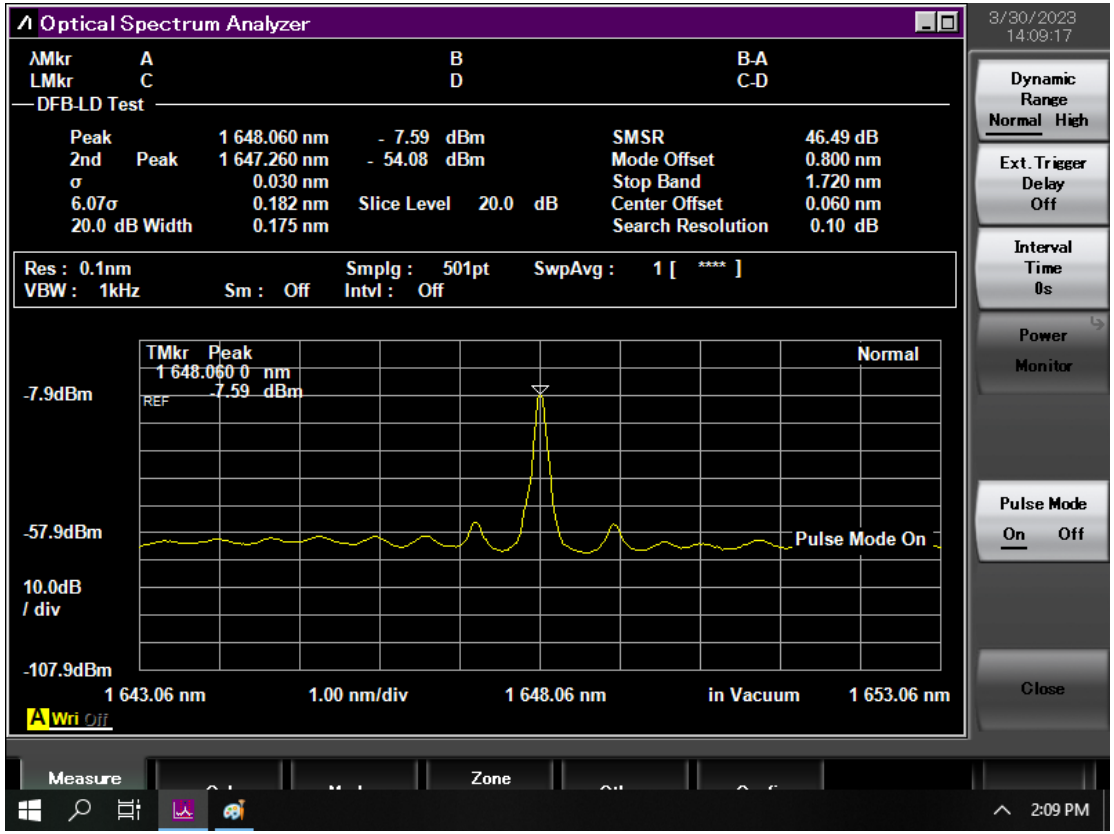
**The Min Hold and Max Hold functions are convenient for measuring long-term variation in optical level. It displays real-time maximum and minimum levels on-screen.**



# Pulsed Light Measurement *New !*

**This function measures the pulsed optical spectrum output from the LD under asynchronous conditions without a trigger signal.**
**The SMSR can be evaluated in a similar time to measurement of a CW optical signal.**




## SMSR repeatability: ±1.4 dB*

*With MS9740B-020 Option, ±1.8 dB (with MS9740B-009)
10 dBm input at Peak Power, DFB-LD, Wavelength 1550 nm, SMSR ≤ 45 dB, No Polarization, SM Fiber。
Pulse conditions: Pulse Oscillation Conditions ≥5 kHz, duty >1%, Pulse Mode on, VBW=1 kHz, RBW= 0.1 nm, span ≤ 10 nm,
Sampling Point 501, 23°C±5°C

***The pulsed light measurement function requires the MS9740B-020 option.**

# Easy Optical Fiber Connection

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## Supports SM and MM fibers

- ✓ **One MS9740B unit supports measurement of both SM and MM fibers. Moreover, fiber light-reception is used for optical input. Backscatter attenuation of <35 dB (1300 nm/1550 nm) assures accurate DUT backscatter measurement.**

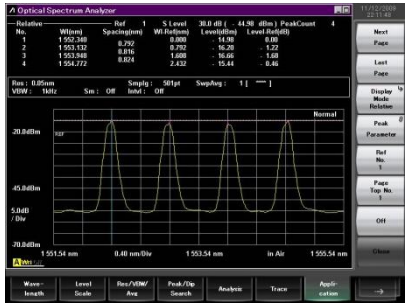
# Transfer Data to External PC Controller


## Batch transmission of analyzed data

- For example, center wavelength, optical level and OSNR analyzed by the LD-Module application can be transferred as a batch to the external PC controller, supporting easy data management.

## Transfer BMP and PNG image files

- Screen image (BMP, PNG) data captured by the MS9740B can be transferred to the external PC controller. This is convenient when saving screen images separately from binary data.



# Remote Tool Package

## MS9740B Remote Tool Package

- **The Remote Tools Package includes the quick-start guide, sample programs, C# class library, and LabVIEW Driver.**
  **This package can be downloaded from the Anritsu site.**
  - **Sample Programs: MS9740B control program created using Visual Basic**
  - **C# Class Library: DLL using NET framework**
  - **LabVIEW Driver : NI LabVIEW 7.1 driver**


**Remote Command Language**
- **Native**
- **SCPI**

**Remote Tool**
- **Sample Program**
- **C# Class Library**
- **LabVIEW Driver**

Note:
When controlling the MS9740B remotely using the Ethernet port, a VISA*1 driver must be installed in the PC controller. We recommend using NI-VISA™*2 from National Instruments™ (NI hereafter) as the VISA driver.
More detail information of NI-VISA™ usage, please refer to the MS9740B product brochure.

Glossary of Terms:
*1: VISA: Virtual Instrument Software Architecture
I/O software specification for remote control of measuring instruments using interfaces such as GPIB, Ethernet, USB, etc.
*2: NI-VISA™
World de facto standard I/O software interface developed by NI and standardized by the VXI Plug&Play Alliance.

# Wavelength Calibration Function

**Wavelength accuracy of ±20 pm is assured by calibrating the wavelength using the Light Source for Wavelength Calibration (Opt-002). In addition, the MS9740B has a function for automatically calibrating wavelength if the ambient temperature and pressure change, based on the first calibration data.**

**[Auto align and calibration procedure]**

***One Step Operation***

**Auto Align** → Auto → **Wl. Cal.**

With internal MS9740B-002 Opt.

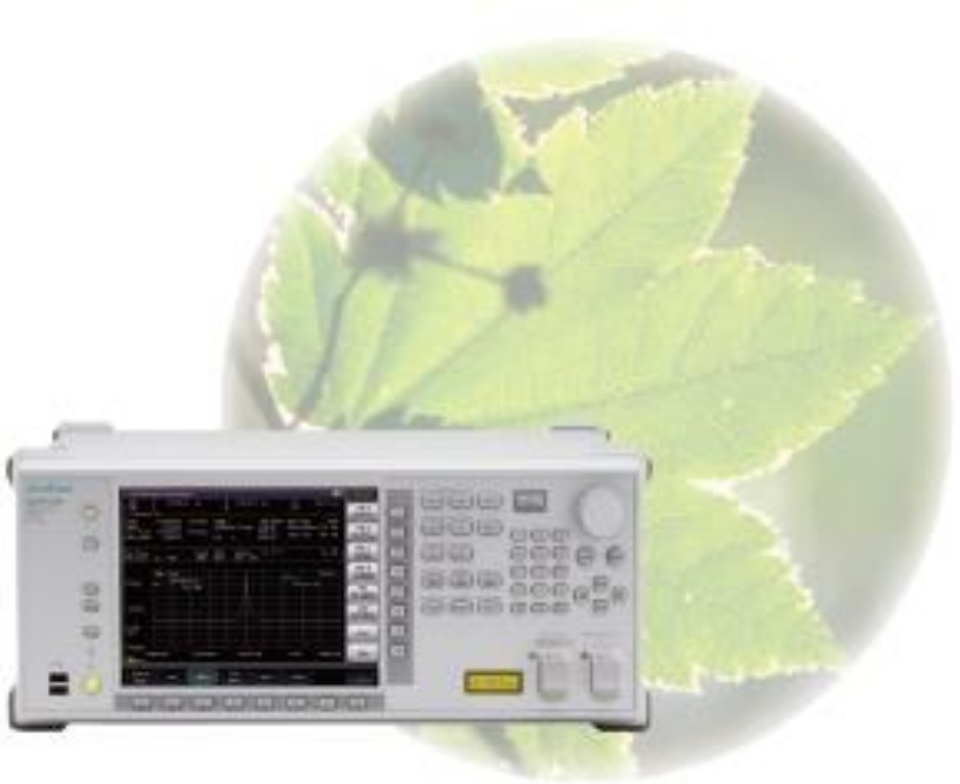
* No External Light Source

**Calibration Complete**

- ✓ **Auto Alignment** (for level accuracy and dynamic range)
- ✓ **Wavelength Accuracy** (±20 pm: 1520 nm to 1620 nm)

**Weighing in at under 15 kg, the MS9740B is the world's lightest benchtop spectrum analyzer.**

**Consuming under 75 VA, or less than half its predecessors, it's al eco-friendly too. And not only does it save power, it's quiet as well, making it the ideal benchto companion.**



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公知 2023-5 MJM No. MS9740B-E-L-1-(2.00)