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ANDO

Optical Amplifier Analyzer
AQ8423A/B

New Optical Pulse Method for Noise Figure and Gain Optical Amplifiers



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New optical pulse Method for Noise Figure and Gain Optical amplifiers

General

Ando's AQ8423A/B optical amplifier analyzer employs a new optical technique the pulse method for easy, accurate evaluation of optical fiber amplifiers.This measurement system is able to provide accurate measurements even when the input level of the optical amplifier signal is high, a challenging task with conventional measurement systems. It is available in two models Type A, with a built-in optical booster amplifier, and Type B, without the optical booster amplifier.

Features

- Employs optical pulse-method for the optical method
- High-performance DFB-LD light source can be built in
- Optical amplifier input level exceeds +3 dBm (2mW)
- Enables NF measurement by measuring the beat noise between optical fiber amplifier signal power and ASE power
- High-accuracy gain and NF measurements
- Simple configuration and operation provides substantial savings in time and cost for both R&D and production line applications
- East maintenance

Operation and functions

- Simple operation: Complete measurements with one touch
- Superior visibility: 9.4-inch color LCD
- Data logging: 3.5-inch FDD (1.2/144 MB), internal memory, internal printer
- Calibration function: Internal self calibrating function
- Video output: VGA compatible output

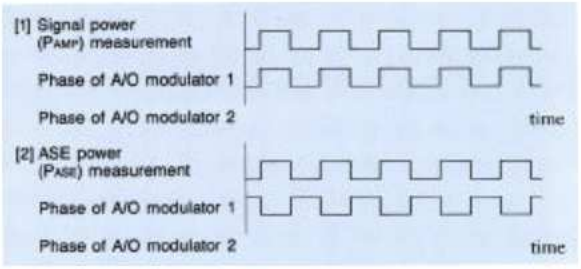
Measurement principle

The pulse method utilizes an A/O modulator to separate the amplified optical signal power (PAMP) and ASE power (PASE), and to measure the power of each. The following describes the measurement process.
Tunable laser source output (PcW) is modulated at A/O modulator 1. Then the modulation optical signal is input to an optical amplifier. Its modulation frequency is significantly shorter than the fluorescence life of the EDF's erbium ion [500kHz time cycle 2μ sec.)]. (Modulation frequency for the system is set at 1MHz.) This allows separate measurement of the amplified optical signal power (PAMP) and ASE power (PASE) by shifting the phase of A?O modulator 2 to an identical phase or 180 degrees opposite, By applying these measurement values in equations ❶ and ❷. You can obtain the optical amplification gain (G) and noise figure (NF).

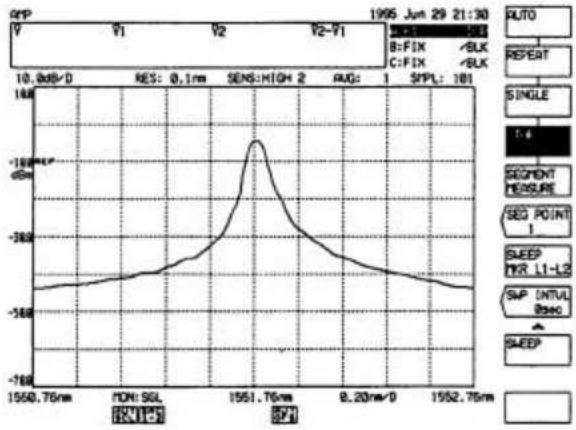
$$G = \frac{P_{AMP} - P_{ASE}}{P_{INPUT}} \cdots\cdots\cdots\cdots \text{Equation } ❶$$

$$NF = \frac{P_{ASE}}{h \nu G B_O} + \frac{1}{G} \cdots\cdots\cdots\cdots \text{Equation } ❷$$

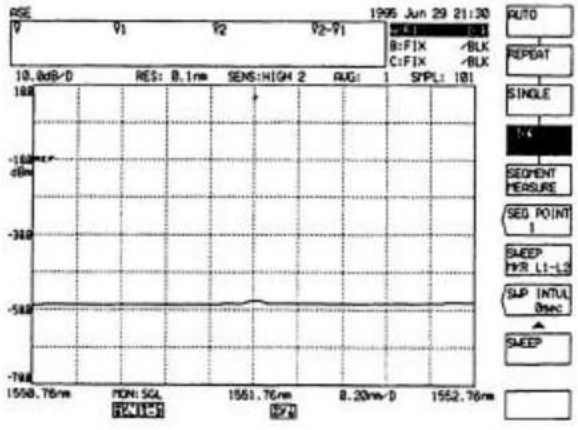
P_{INPUT}	: Signal power of optical amplifier input	ν	: Central frequency of optical signal
P_{AMP}	: Amplified signal power	B_O	: Transmission bandwidth (At P_{ASE} measurement)
P_{ASE}	: ASE power	G	: Optical amplification gain
h	: Planck's constant		



Amplified signal waveforms of optical spectrum analyzer

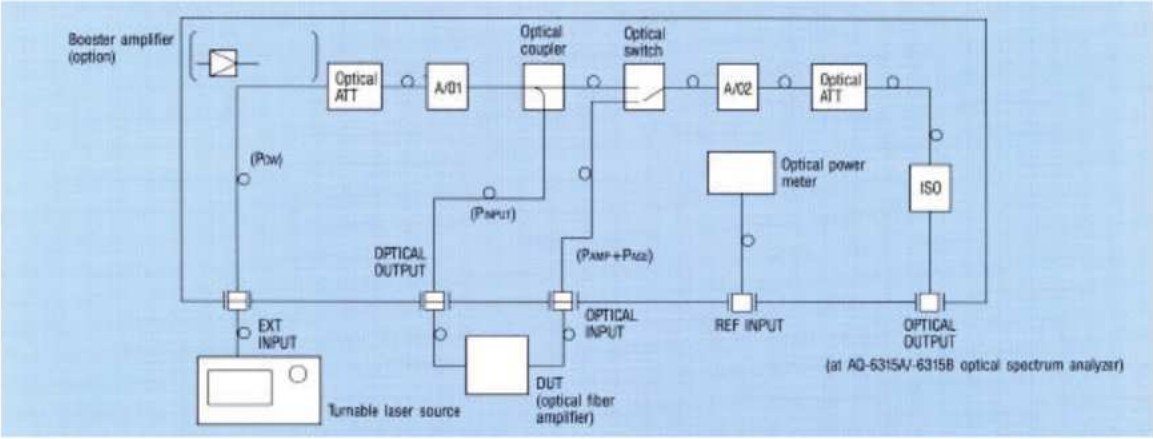


ASE waveforms of optical spectrum analyzer



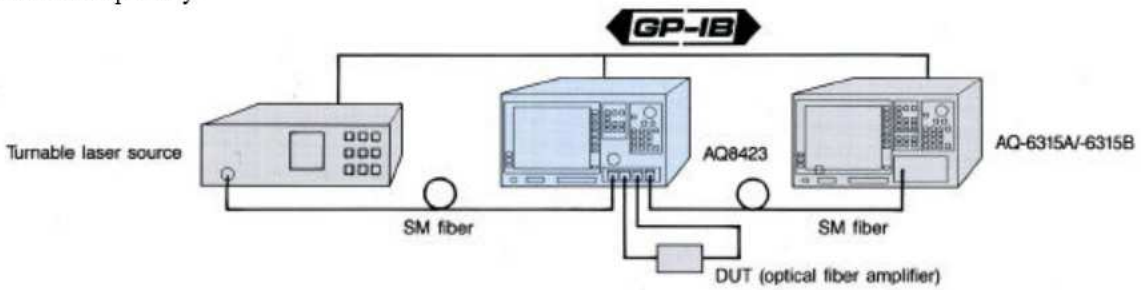
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Circuit Configuration



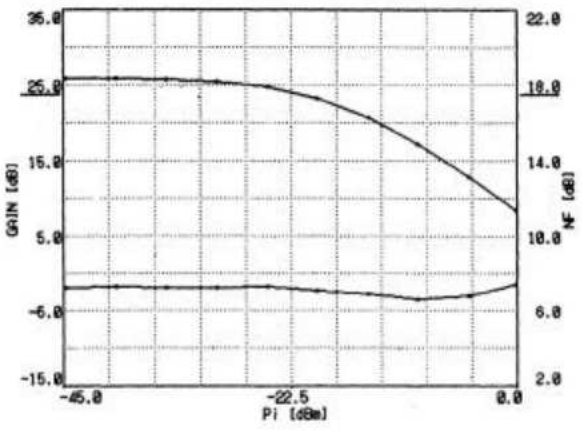
Measurement system

The optical measurement method requires that the AQ8423 be used with the AQ6315A/B optical spectrum analyzer. Furthermore, the AQ8423 incorporates all necessary functions (except for the optical spectrum analyzer itself), to enable measurement systems with very simple configuration. Both the tunable laser source and AQ6315A/B must be purchased separately.

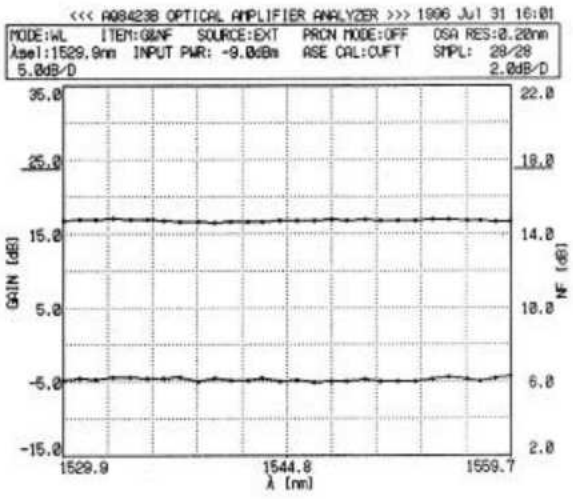


Example of Measurement Result

● Measurement example depending on input power



● Measurement example depending on wavelength



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Specifications

Model		AQ8423A	AQ8423B
		With tunable laser source ❶ and ❷	
Measurement wavelength		1500 to 1570 nm ❸	
DUT input power range		-45 to +3 dBm (1550 to 1560 nm) -45 to +0 dBm (1530 to 1570 nm)	-45 to _6 dBm ❸
DUT output power measurement range		-30 to +30 dBm	
Accuracy ❹			
Gain measurement		± 0.20 dB	
NF measurement		± 0.30 dB	
DUT input power set		± 0.20 dB	
DUT output power measurement		± 0.20 dB	
Measurement time	1st point	Approx. 30 sec. (normal measurement mode) Approx. 80 sec. (precision measurement mode)	
	2nd and following point	8 to 15 sec.	
Setup time		Min. 1 hour after power ON	
Functions	Measurement	Intensity dependence: Input-gain, input-NF, input-output Stability: Time-gain, time-NF, time-input, time-output	
	Display	1-, 2- and 4-waveform display, numerical data display	
	Calibration	Optical output power calibration mode, optical input power calibration mode, wavelength and effective resolution calibration mode, DUT delay time calibration mode	
	Other	Calendar function, clock function, label display	
Storage	Built in FDD	3.5-inch 2 HD (1.2/1.44 MB)	
	Internal memory	Waveform data and measurement parameters (for 16 waveforms)	
Printer		Built In high-speed printer	
Interfaces	GP-IB	2 ports standard	
	Other	Video output (VGA compatible)	
Display		9.4-inch color LCD, 640×480 dot resolution	
Optical I/O connectors	Main unit	SC-type (ultra-PC polished face)	
	DUT	FC-type (ultra-PC polished face) (for supplied standard fiber)	
Power supply		AC100 to 120 V, 200 to 240 V 48 to 63 Hz, approx. 150 VA	
Environmental conditions		Operating temperature: 25 ± 10°C Storage temperature: -20 to 50°C Humidity: 80% or less (no condensation)	
Dimensions and mass (main unit only)		Approx. 425 (W)×222 (H)×450 (D) mm, approx. 20kg	
Accessories		Optical fiber cord: 3 (SC-type ultra-PC, FC-type ultra-PC Connector adapter: 2 (SC, FC) Power cord: 1 Floppy disk: 2 Recording paper: 2 rolls User's manual: 1	

Notes:
❶Standard specification unit uses tunable laser source.
❷An internal DFB laser light source can be provided as an option.
❸Wavelength range is dependant on tunable laser source.
❹In precision measurement mode.

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