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# Optical Measuring Instruments and Optical Device Test Systems

For Measurement of Optical Modulators and Laser Diodes

## Q7606A/7606B

- Fast measurement of dynamic chirp: 30 sec. or less
- High measurement resolution: Approx. 20 MHz or less
- Excellent chirp reproducibility: Within  $\pm 5\%$
- Wide measurement frequency band: 50 GHz or greater
- Automatic polarization adjuster function
- Built-in optical amp (Q7606A)



(Photo is Q7606A)

## Q7606A/7606B

### Optical Chirp Test Set

- Measures dynamic chirp in 30 seconds or less.
- High measurement resolution: Approx. 20 MHz or less
- Excellent chirp measurement reproducibility: Within  $\pm 5\%$
- Wide chirp measurement frequency band: 50 GHz or greater
- User-friendly operation with Windows compatible software

### Enables Easy Dynamic Chirp Measurement for Modulators and LDs in 30 Seconds or Less.

As the range of optical transmission systems increases and capacity rises through higher bit rates and the application of wavelength division multiplexing (WDM) technologies, measurement, evaluation, and control of the chirp generated by optical devices such as optical modulators is becoming increasingly vital for improving the quality of transmission. The Advantest developed Q7606A/7606B optical chirp test set enables easy measurement of dynamic chirp from components such as optical modulators and laser diodes (LDs) in 30 seconds or less when used with a digital sampling oscilloscope and a PC.

### New Functions for Mass-Production Lines

#### New function 1: Automatic polarization adjuster function

This function quickly performs optimal, automatic adjustment of polarization conditions during chirp measurement.

#### New function 2: Built-in optical amp (Q7606A)

The Q7606A features an integrated output stage optical amp. Not only does this function effectively improve measurement precision, it can also increase the S/N of the measurement signal through automatic adjustment of amp gain control, thus allowing analysis of chirp measurement under the optimal conditions at all times.

### Dynamic Chirp Measurement of Digital Modulation Optical Signals with the Q7606A/B, Pulse Pattern Generator, and Sampling Oscilloscope

A slight chirp is generated when using an external modulator to perform high-speed digital modulation of optical signals from an LD. Since chirp affects the transmission quality of an optical communications system, evaluation of this chirp is an important measurement item for the development of external modulators.

As shown in Figure 2-1, combining a pulse pattern generator and a sampling oscilloscope enables evaluation of the dynamic characteristics of chirp in the time domain. The Q7606A/B can also measure the chirp of a 10 Gbps digital modulation optical signal thanks to its built-in wide-band interferometer (FSR: 150 GHz, demodulation band: 50 GHz). Figure 2-2 shows the main components of the system. An example of the intensity and chirp components of digital modulation employing an LN modulator is shown in Figure 2-3.

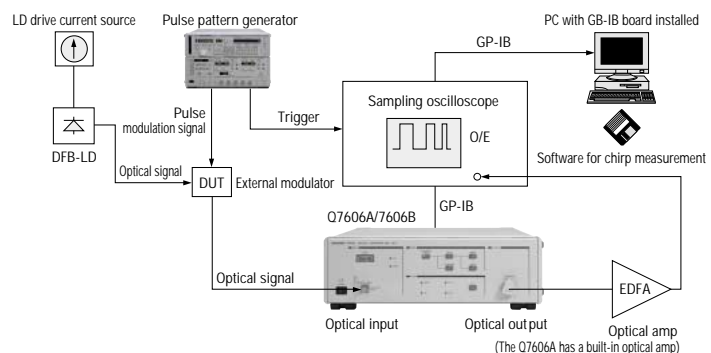


Figure 2-1 System Connection Diagram

# Optical Measuring Instruments and Optical Device Test Systems

For Measurement of Optical Modulators and Laser Diodes

**Q7606A/7606B**

## Specifications

### Functions

#### Measurement characteristics:

Controls the differential points of the optical frequency and intensity of the integrated optical fiber Mach-Zehnder interferometer and outputs incident light after converting the optical chirp (optical frequency modulation) component into the optical intensity component. Divides the optical chirp (optical frequency modulation) and the optical intensity modulation component.

#### Polarization compensation:

Automatic polarization compensation with an optical fiber polarization controller. Includes automatic gain adjuster

#### Built-in optical amp (Q7606A):

Built-in optical amp with automatic gain adjustment function. Optical output power is 0 dBm or greater, and is independent of input optical power. External optical amp available to ensure conformance with the external O/E converter, eliminating the need for adjustment of optical output power or optical amp gain.

	Q7606A	Q7606B
Measurement wavelength band	1530 to 1580 nm	1510 to 1590 nm
Input optical power range	-10 to +10 dBm	-20 to +10dBm
Free spectral range	150 GHz ±15 GHz	
Demodulation band <sup>*2)</sup>	100 Hz to 50 GHz	
Demodulation frequency deviation	65 GHz p-p or less	
Demodulation frequency resolution	20 MHz p-p or less <sup>*3)</sup>	
Insertion loss	-	10 dB or less
Optical output power	0 dBm or greater <sup>*4)</sup>	Input optical power (dBm) -10 dB or greater <sup>*5)</sup>
Output stage optical amp	Automatic gain adjustment function Built-in optical amp	- <sup>*6)</sup>
Input optical polarization compensation	Built-in automatic polarization compensator	

\*1) At 23°C ±5°C

\*2) 130 MHz standard, 1 dB down

\*3) Depends on the measurement level resolution of the external sampling oscilloscope and the input optical power.

\*4) Average optical power output; optical power automatically adjusted by automatic gain adjustment function.

\*5) Depends on input optical power.

\*6) When Q7606B is used for chirp measurement, an optical amp with adjustable gain will ordinarily be needed to obtain optical power compliant with the external O/E input optical power range.

Main system components	Applicable product	Remarks
Optical chirp test set	Q7606A/7606B (Advantest)	
Software for chirp measurement	PQ76000401-FK (Advantest)	Compatible with Windows95, Windows NT4.0 and later
Pulse pattern generator	D3186 (Advantest): Clock option 10 (150 MHz to 12 GHz) or clock option 11 (2 GHz to 12 GHz) is required	
PC		OS: Windows95, Windows98, Windows NT4.0 and later
GPIB board		Manufactured by National Instruments
Sampling oscilloscope	Techtronics: 11801C, CSA803 Agilent Technology: HP83480	
Plug-in (O/E converter) for sampling oscilloscope	Techtronics (bit rate, sampling head, O/E converter): 2.5 Gbps/SD-22/SD-44, 5 Gbps/SD-26/SD-44, 10 Gbps/SD-32/SD-48 Agilent Technology: HP83485	
Optical amp		Gain fixed

Figure 2-2 System Components

### I/O specifications

**Optical I/O:** FC/PC connector

**GP-IB:** IEEE488-1978 compliant

### General specifications

**Operating environment range :** Temperature; 0°C to +40°C

**Relative humidity :** 85% or less (avoid condensation)

**Storage environment :** Temperature; -20°C to +60°C

**Relative humidity :** 90% or less (avoid condensation)

**Power supply:** AC100V to 120V, AC220V to 240V 50/60Hz, 85VA or less  
Auto-switching between 100V and 200V systems

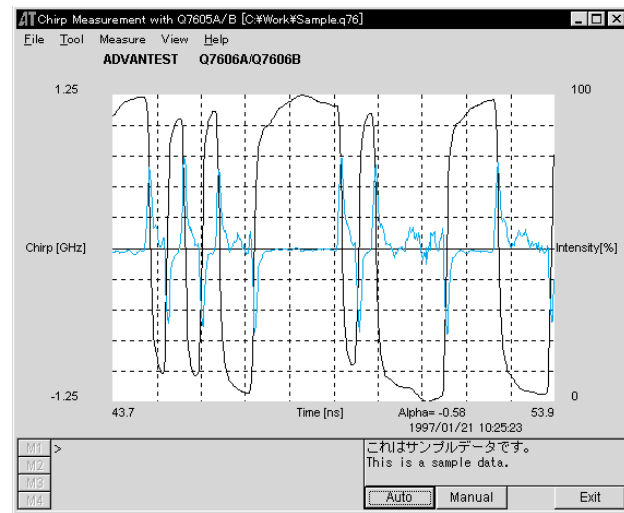


Figure 2-3 Example of Chirp Component Measurement



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